

CIRCULATING COPY

Please Return Promptly



Less Is More Compaq's Deskpro 386S

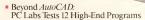
Revved-Up Model 50Z,

Three 386 Desktops



All About Intel's New 386SX Chip: Why You'll Never Buy Another 286





- Apple's New LaserWriters: Faster, Cheaper PostScript
- Tapping Word's Potential with Style Sheets



Better By Desire

CPU 286/16 \$1,395

CPU 386/20 \$2,095

 80386 CPU • 1MB RAM (Expandable to SMB on board: Norten V3 SI rating 23 1.2 MB tloppy drive ● Dual floppy/hard disk controller . 101-key enhanced key AMI BIOS • Keyboard/hardware se

Sasic System Price	\$2.095
Monochroma System	\$2,235
With 20MB Herd Disk	\$2,485
With 40MB Hard Disk	92,630
EGA Systam	\$2,685
With 20MB Hard Disk	\$2,935
With 40MB Hard Disk	\$3,080

CPII 286/P

\$1.895 Norton V3 Strating 15.3 • 144 MB 3 5" floppy drive . Floppy/hard diek controller 102-key Enhanced keyboard • 2 serial ports. 1 parallel port, game port • Clock/ Calendar with 10 year battery life • Phoenix BIOS • Keyboard/software selectable. BIOS • Keyboard processing speed • Supertwist EL backlit LCD (640 x 400)

System with 20MB Hard Disk \$1.895

ppy 'drive . Dust Floogy'hard disk

 Phoenix BIOS processing speed 	۰	Keyboard	switche
	ŀ		
Basic System Monochrome			\$1,3

Basic System Price	\$1,395
Monochrome System	\$1,535
With 40MB Herd Disk	\$1,930
EGA System	\$1,985
With 40MB Hard Disk	\$2,380
1	



CPU 286/12 \$1,095

State . 512K RAM (Expandable to 4MB on troller • 101-key enhanced keyboard • 2 serial ports 1 perallel port game port

enix BIOS . Keyboard/soft

Monochrome System	\$1,235
With 20MB Hard Disk	\$1,48
With 40M8 Hard Disk	\$1,63
EGA System	\$1,68
With 20MB Herd Disk	\$1,935

CPU TURBO XT \$695

. CPU ranning at 4 77 & 10MHz . 640K at 0 key AT style keyboard . 1 serial port. 1 th battery back-up . DTK BIOS . Key

With	20M8	Hard	c
EGA	System	n	
With	20MB	Hard	E

\$1,440

THE COMPLETE NETWORKING SYSTEM NOVELL NETWARE: 4 NODE WORKSTATIONS WITH CPU 286 FILE SERVER COMPLETE WITH 40MS HARD DISK 25/995

🔤 TO ORDER, CALL (800) 824-2936 😂

We accept Visa, Mestercard, and cashler's checks. Purchase orders welcome with approved credit. Personal checks teke 15 days to clear Written inquiries should be sent to CPU, Dept. 28, 12803 Schaberum Avenue, Irwindale, CA 91706 Hours: Monday through Friday, 7 a.m. to 6 p.m. PST, Saturday, 10 a.m. to 3 p.m. PST.

Computer

Tach Support: (616) 614-2367 © 1988 Computer Products United, Irwindele, California. All rights reserved. Pricing and system configurations are subject to change without notice



Products United

All systems carry e 30 day money back guarantee excluding shipping charges. All basic systems carry a comprehensive 1 year parts and labor warranty. During this period, we will repair of place, at our option, any defective part at no additional charge. Add-on products (hard drives monitors, etc.) carry manufecturers' warranties. VHAT'S INSIDE

Get Your Disks Moving! cache

"In addition to being one of the festest disk-cechina progrems aveileble. Vceche is also en elleround performance booster. Jeff Holtzman, PC Resource

Fast - increese your effective progrem speed up to 10 times! Date that has been read from your hard disk is retained in your computer's fest internel memory for super fest eccess the next time you need it.

Now Faster! - use the new Deferred Write option to ceche disk writes, for even faster processing.

Safe - use the Write Through option for meximum sefety from system feilures end power alitches.

Adaptable - use up to 15 megebytes of extended or expanded memory, or up to helf e megebyte of stenderd memory. Ceche multiple herd disks using stenderd BIOS interface or software driver. Easy - installs with one statement:

requires no modification of your existing programs; transperent to all normal programs. Compatible - even with AutoCAD,

removeble media drives, disk pertitioning software... Includes - Vkette diskette acceler-

ator, Vscreen mono accelerator, Vkeyrate keyboerd eccelerator. Don't wait any longer! Cali toll free today and get your disks

moving with Vcechel \$59.95 \$3 shipping/handling GA add 6.5% sales tax

GOLDEN BOW SYSTEMS 2870 Fifth Avenue Suite 201 Sen Diego, CA 92103 800/284-3269

Vosche operates with DOS systems. Vosche is a tradamerk of Golden Bow Systems AutoCAD is a trademark of Autodesk Inc. OOS is a trademark of Microsoft Corp and International Business

York to preview a hot new product, they're

When PC Magazine's editors fly out of New usually in search of speed increases or performence improvements. That's why it was such a surprise to executive editor Bill Howard and PC Labs director John Dickinson when the Compag Deskpro 386/25, a 25-MHz 386-based PC they had traveled all the way to Houston to see, was quickly upstaged by the second



Bill Howard and John Dickinson discover a new breed of 386 machine: the Compaq Deskpro 386S.

of the two new machines that they were there to preview.

What was it that stole their attention? The Compaq Deskpro 386S, a small-footprint 386 machine built around Intel's long-rumored and long-awaited P9 chip, now assigned the name 386SX

As Bill Howard points out in this issue's cover story, the 386SX-which puts all the advantages of the 80386 processor into a chip that operates in the 16-bit environment of the 80286-will force you to reconsider any planned purchases of 286based machines in the next year. There is no technical reason why machines built around the chip should list for more than \$200 over today's crop of AT compatibles once SX machines become readily available. Has Intel really reinvented the midrange of the PC performance arena with a single stroke? The success of the Deskpro 386S, which John Dickinson reviews in this issue, will tell.

But there's no need to grieve for the 286s you already own (brain-damaged though they may be), because once add-in board makers get ahold of the chip, 386SX brain transplants for AT compatibles will become common, especially if the price comes in below \$500, which it very likely

Also in this issue, PC Labs tackles the complexities of high-end CADD software. To help steer us in the right direction, we asked for the assistance of Dr. Joel N. Orr. the president of the National Computer Graphics Association and one of the nation's leading experts on CADD. Orr was also the guiding force behind our review of low-end CADD packages last year ("Upwardly Mobile CADD," PC Magazine. December 8, 1987). In his introduction to the 12 product evaluations. Orr writes not only about the state of CADD today but also about the future of CADD, a world where design and drafting merge into one artificially intelligent process.

The latest free utility from our productivity experts is RAMVIEW, a memoryresident program that opens a window into memory to let you search for hex and ASCII strings. It's the ultimate Peeping Tom for assembly code and DEBUG buffs You'll find RAMVIEW in the Utilia ties column.

PC Magazine: The Independent Goods to IBM Shandard Personal Computing ISSN (#0888-897) is published by-weekly except in July and August for \$64.97 for one year (2) roses.) Additional protage \$17.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per \$10.00 per year for Cauda and all other foreign countries. \$20.00 per \$10.00 per year for Cauda and all other foreign countries. \$20.00 per \$10.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. \$20.00 per year for Cauda and all other foreign countries. mading offices. POSTMASTER: Address changes to PC Managery, P.O. Box 54093, Boulder, CO 80321-4093





ntroducing the PostScript laser printer that blacks out at high speeds.

The new QMS-PS' 810 can compose and print the most complex pages in record times, with richer, more saturated blacks than ever before. All with the desktop publishing power of Adobe PostScript', and the superior print know-how of QMS, an industry leader.

Under the bood QMS ASAP" (Advanced System Architecture for PostScript) is proprietary technology that helps eliminate the hardware bottlenecks that hinder other PostScript printers. As a result, QMS-PS 810 boasts processing speeds remarkably faster than other PostScript printers in its class. And faster output means greater productivity. In addition, the QMS-PS 810 laser

printer's new Canon* SX* print engine covers solid areas and prints fine detail better than previousgeneration engines. Past start, strong finish. You can adomy to documents with one or all of the 35 Adobe typefaces. Thanks to PostScript, there's an infinite number of font variations available. You can also make type as large or as small as you sunt. And put it anywhere on the page. In fact, with PostScript you enjoy total control over the design of your page. It gives you the complete would otherwise be virtually impossible. So you got high-quality output earchy how you want it.

Along with PostScript, the HP LaserJet + ", Diablo" 630 and HP-GL" printer emulations are added for your non-PostScript software.

The QMS-PS 810 laser printer is easy to use, maintain, and comes with a one-year warranty. It's available from Laser Connection dealers. Laser Connection is a sales and marketing subsidiary of QMS. For the dealer nearest wor call 1.800-523-2696.



The following are trademarks of their respective companies: QMS, QMS-PS, AS Laier Connection of QMS, Inc. PuriScript of Adobe Systems, Inc. Caron, Caro SX of Canon, U.S.A. Laierdet + , ISP-CL of Hewlett-Packard, Pubble of Xeron C

8-page/minute QMS-PS 810 laser printer





COVER STORY

Compaq's Deskpro 386S: Less Is More John Dickinson/ Built around

Intel's eagerly anticipated 386SX chip, the newest Deskpro gives you all of the 386's processing advantages in a totally compatible 286 data bus structure. Is this the machine that will make ATs obsolete? 93



New chip, new PC: Compaq's Deskpro 386S, page 93.



FEATURES

GRAPHICS High-End CADD: Expanding to New

Dimensions
Joel N. Orr/ The most
powerful PC CADD
systems continue to
strive for greater ease of
use and fuller
functionality. PC Labs
looks at 12 high-end

PRINTERS No-Wait LaserWriters: Apple Adds Speed to the Power of PostScript

Power of PostScript
Carol Ellison and Bill O'Brienl
Apple's two new LaserWriters
still provide the PostScript
flexibility that PC users have
fallen in lowe with, but now
they're doing it faster than

COMMUNICATIONS Call Accounting: Tracking PBX Costs Fronk I. Darder, In., and

PBX Costs
Frank J. Derfler, Jr., and
Greg Campbell/ By hooking a
PC into your PBX system and
running a call accounting
package, you can produce
detailed reports of the calls
made on each line, which helps
to keep your costs under

A

UTILITIES Pop-up Help: Instant Answers at Your Fingertips Catherine D. Miller! No one ilkes to read documentation, and now you don't have to.

CONNECTIVITY Making Connections: Clustered CPUs

ACCOUNTING Bringing Harmony to

EDITORIAL PRODUCT INDEX.....5

Cover Photograph: Roberto Brosan

FIRST LOOKS

Hands On:

. IBM's NEW PS/2s: A zerowait state Model 50 and three 386 Model 70s from IBM Compaq Deskpro 386/25 nicks up where the 386/20 leaves off

 WordPerfect 5.0: Futuristic features behind a familiar face · LaserTORQ: Print spooling for lasers

· PageMaker 3.0 adds automatic text wrap, snaking columns, and style sheets Freedom Modems: 4,800 bps, no wires attached · Battery Watch monitors

laptop batteries, restores battery life · PC-tPost turns PC into electronic-mail host33

AFTER HOURS

- . Test Drive: Fast cars and fast times from Accolade
- · The Seven Spirits of Ra-Adventures in ancient Egypt . SpaceM+A+X: Building a
- space station on a tight schedule
- · Sexu-Cation: A painless way to teach kids the facts of life · Breakthrough! Mentor: Electronic flash cards 530

Richard Hale Shaw! Use these tips and techniques to write the

UTILITIES

RAM Snooping with RAMVIEW Frank Dever and David Thomas! Use RAMVIEW to instantly search and sift through your PC's memory in ASCII and hex

PC MAGAZINE HELP FILE ENVIRONMENTS

Presentation Manager Menus Charles Petzold/ How to interface key and mouse input with the Presentation Manager through a menu...... 395

POWER PROGRAMMING **Fully Qualified**

Filenames in C Ray Duncan/ A C program that qualifies filenames by adding a complete drive and path ... 411

SPREADSHEET CLINIC

Douelas Cobb and Steven Cobb/ An undocumented 1-2-3 macro command; a serious bug



Pick your favorite hot rod and let loose on the open road, page 530.

PRODUCTIVITY

LETTERS TO

PC MAGAZINE.....15

PC ADVISOR Mitt Jones/ MCA-compatible machines, improving dot matrix output, cataloging music in a database, 101-key keyboard. with function keys at left27

BILL MACHRONE Making MIS Work65

JOHN C. DVORAK The Ugly Reality: Unix Is in Your Future71 Inside Track.....

JIM SEYMOUR Don't Let the Beta Bugs

STEPHEN MANES The Generic Speech and What It Means85

Direct Marketing Connection471 Marketplace......490 Advertisers' Product

Reader Service Card .. 521 Coming Up527 dex to Advertisers...

PC LAB NOTES Writing Optimal C: Part 1

format—even from inside your current applications 367

USER-TO-USER Salvatore P. Ricciardi/ Useful 343

batch file techniques that return you to the directory where you started; restricting applications to running once daily 431

POWER USER

Craig L. Stark/ Accessing FIND in dBASE III Plus with a single keystroke: sorting WordPerfect records into a more useful date format; linking Clipper faster 437

LANCHAGES Robert L. Hummel/ A Pascal program that disables the Print

Screen function; creating colorful screens in Pascal: an excellent C tool for altering the master environment....... 445

PC TUTOR Robert L. Hummel/ A simple way to pass arguments from DOS batch files to BASIC programs; the importance of COMSPEC......457

CONNECTIVITY CLINIC Frank J. Derfler, Jr./ Some practical reporting and monitoring programs for developing and installing applications using the NetBIOS service module 46



Editor-in-Chlef and Publisher Bill Machrone Associate Publisher J. Samuel Huey

Executive Editors Bill Howard, Luisa Simone, Gus Venditto

Workgroup Systems Editor Frank J. Derfler, Jr

Workgroup Systems Some 7 Frank 1 Derrher JF.
Senior Editor Mill Decel.
Fig. 1. Hummel
Senior Technical Editor Royents Conjug. Land Advanced Senior Editor Mills Conference Conjug. Land Academia Menager Editors Greg Pastrice, Paral B. Ross Menager, Copy Ball Lindo Conference Conjug. Senior Conference Conjug. Land Conference Conjug. Co Donald F . Willmott

Production Editor Diane D'Angelo

Assistant Production Editors Jeanne Albrecht, Karen A. Carter Staff Editors Jonathan Matzkin, Edward L. Perratore Assistant Editors Robert Barnett, Glen Becker, Michael Cohn, Carole Goldstein, Stephanie K. Losee, Lonnie Lum, Paul V. Olowacz, Ann Ovodow, M. Stephanic Ricks, David Rosen,

lennifer Zaino Editorial Assistants Fredric Burke, Stephanic Izarek, Michael W. Muchmore, Robert Nisonoff,

Hona Price, Paula Seefeldt, P.J. Springer Proofreader Meakin David Armstrone

Proofereder Meakin David Armstrong
Editorial Sceretary Donna Alfred
General Boniens Minagery Donna Alfred
General Boniens Minagery Donna Alfred
General Boniens Minagery Donna Mirch
General Boniens Minagery
General Stephen Manes, Michael J. Mefford, Edward Mendelson, Barry Owen, Charles Petzold, Jeff Prosise, Winn L., Rosch, Neil J., Rubenking, Jim Seymour, Paul Somerson, M. David Stone,

Manager, PC MagNet Christopher Barr PC MagNet Assistant Manager Wendy W. Huang

Director, Art and Design Mary Zisk Associate Art Director Denise Platkin Art Editor Mariano Nicieza

Ethan Winer

Assistant Art Director Natulic Chu Layout Artists Leigh Margerison, Amy B. Williamson

Director, Graphics and Electronic Publishing Gerard Kunkel Senior Graphic Designer Lauric Wance Graphic Designer Charles Conover Graphic Artists Gary W. Kaplow, Gerard Sarrantonio

Director, PC Labs John Dickinson Manager, PC Labs Bruce Freeman Project Leaders Pamela J. Milland, Francis P. Mitard, Bill O'Brien, Philip F.H. Rose Network Manager Joseph F. Rizzo

Network Manager Joseph F. Rizzo System Support Specialisis Robert W. Kane, Charles Rodriguez Ioventory Control Manager John R. Delaney Ioventory Control Technicians Peter Bastide, Leon Newman

Receptionist Karen Williams Marketing Director Jeff Ballowe Marketing Manager Ellen Atkinson

Public Relations Director Jessica Kersey Public Relations Coordinator Stacy O'Connell

Subscription Director Paul Stafford Single Copy Sales Director Robert Woltersdorf

Advertising Production Supervisor Susan DeFierro
Advertising Production Managers Susan Livoti, Vicki Egan Root
Advertising Production Assistants Michael Genzale, Christine Rottmund

Editorial Production Manager Dennis Fitzgerald Editorial Production Coordinator Mig Dalia Afflick Production Systems Supervisor Linda Harms Production Systems Staff Melvin Foster-Poetsch, Sharon Terdeman

Groop Vice President William Lohse

Advertising Office One Park Ave., New York, NY 10016, (212) 503-5100

ZIFF DAVIS PUBLISHING COMPANY

President Kenneth H Koppe

Group Vice Presidents William Lobec, J. Scott Briggs Senior Vice President, Marketing Paul H. Chook Vice President, Operation Band Davis Vice President, Controller John Vlaches

Vice President, Creative Services Herbert Stern Vice President, Research Marsan O. White

Vice President, Genation Bert Locy Vice President, Circulation Services James Ranaley Vice President, Circulation Services James Ranaley Vice President, Marketing Services Ann Folials Addition Vice President, Chauffed Advertising A Dict Marie Ivans Vice President, Development Seth Alpert Director of Planning Gary A. Gustafso Production Director Walter J. Terlecks

ZIFF COMMUNICATIONS COMPANY

Chairman Phrio B. Korsani President Kenneth H. Koppel

Executive Vice President Stephen C Kahler Senior Vice Presidents Philip Sine, Hugh Treijen Vice Presidents Wilson Philips, J. Makeem Morris, Steven C. Festerson

Secretary Bertram A Abrams

HOW TO CONTACT THE EDITORS The editors of PC Megazine want to hear from you. Comnts. can by letter to One Park Ave . New York, NY 10016-it's probu-Ny the best way to reach us You can also reach us electronically via MCI Med (our account number is 157-9301) or by leaving a note on our Interactive Reader Service when you've finish

depends after the latest utility. If nothing has a human wisce will satisfy you, call us at (212) 503-5255. We are unable to look up stories from past issues, recommend products, or diagnose problems with your PC by phon If you besselv a product advertised in PC Manazine, see dissatnifed, and can't resolve the problem, write (do not call) Jennifer Carretu, Advertising Department, in One Park Ave. In-

clude copiers of correspondence PC Megazine is under no obligation to review unsolicited products. All subrassions accepted for publication become the property of PC Magazine

PCMAGNET PC MagNet, an on-line service, is a source for PC Magazine's

utilities (both programs and source code), the PC Labs Benchmark Test programs, and an under of articles printed in the manager. Callers can upload submissions to PC Mesegiar's Productivity section and join forums to discuss articles printed in PC Magazine with the authors and other readers. PC Mag-Net provides electronic mail and a gateway to CompuServe. For more information see the Productivity section or call (212)

PERMISSIONS, REPRINTS. Muterial in this publication may not be reproduced in one form

without permanene. If you want to quote from an article, use PC Magazine's logo in conjunction with an Editor's Choice desgnation, or repent an article, call or write Jean Lamensdorf, Lacenser Miniager, One Park Ave. New York, NY 10006. SUBSCRIPTION QUESTIONS

If you ware to subscribe to PC Magazine, if you have a question about your subscription, or if you're moving, call or write: PC Mapazine, P.O. Box 54993, Boulder, CO 80322, (303) 447-9330: A 1-year subscription (22 issues) costs \$44.97. Canada and foreign add \$37 (0) per year. New subscriptions and ad-dress changes take 6 to 8 weeks to process. For back muera, write Februs Hanter, Back Issues Department, PC Manazine P.O. Box 5999, Cherry Hill, NJ 08134. Send \$8 per usus (check or money order, \$9 outside the U.S.J

Editorial and Business Office: One Park Ave., New York, NY 1000s. Edworal (212) 503-5255. Advertising (212) 503-5100. PC Magazine is an independent journal, not affiliated in any way with emational Basiness Machines Corporation 185M sca registered trademark of International Business Machines Corp. Entire con-tents Copyright C 1988 Ziff Davis Publishing Co., a deviation of Ziff Communications Co. All rights reserved, reproduction in whole or

or part without permission in prohibited The following net trade-marks of Zell Communications Co., PC, PC: The Independent Guide to Blat Sandard Personal Computing, PC Magazine, PC Mart, PC Labs, PC Communicates, PC Tutor, User-to-User, Fower User, Power Programming, Spreadshort Clinic, The PC Utables, PC Lab Notes, PC **♥**BPA Advisor, First Looks, PC Product PC MucNet



It looks good on paper.

You expect excellent letter-quality print from a 24-pin printer. And Citizen's new precision-built Tribute™ 124 delivers

With razor-sharp letter definition at 66 cps. Attractive correspondence quality at 132 cps. As well as crisp, impressive draft

printing at 200 cps.

You might be surprised, however, to find that the versatile Tribute 124 offers quite a bit more. Like a built-in push or pull tractor with top, rear or bottom feed. Automatic paper loading. Outstanding compatibility. Push-button convenience of a front control panel. Even optional color printing.

It also provides a wide selection of typestyles via available font

cards. And produces striking high-resolution graphics.

With all these value-added features and an exceptional 12month warranty, the Tribute 124 is very affordable. So, not only does it look good on paper, it looks good for less paper.

For the Citizen printer dealer nearest you, call 1-800-556-1234,

Ext. 34. In California, call 1-800-441-2345, Ext. 34.

Printers that run like clockwork.

convensional utilities at once

akthru 286 was the cent of choice PC BusinesSoftwareview (Rated #1) Athru 286 is a good value and a quality product backet

by effective support."

Dan A. Griffin

The Newsletter of the AutoCAD User's Group 'The PCSG Breskthru 286 achieved the best performer results of the caching boards tested." Ted Mirecki, PC Tech Journal (Rated #1)

'The 12-MHz Breakthru 286-12 spendup b of those tested, but not the most ex-Oned ower basis, it could be called the chea ble for an XT

Mark Welch, Intervente (Rated #1)

Think You Need an AT?

Make Your IBM PC Faster Than an AT in Just 5 Minutes!

Accelerator Cards: Speed and Value

- ☐ Microspeed Fast 88 \$149 ☐ Microsoft Mach 10 £106 ☐ Univation Dream Board \$512 ☐ Orchid Turbo EGA 5945 ☐ ST&D Standard 286
- \$995 □ Classic Speedpack 5995 ☐ Orchid PC-Turbo 286 \$1 195 *** REPRINTED FROM INFOWORLD, APRIL 27, 1987

LIGHTNING™-FREE with Breakthru speedup hardware 589.95 purchased separately

Breakthru 286-8MHz-\$395 Breakthru 286-12MHz-\$595

☐ Breakthru 286-12

We are excited about our three speedup products. You probably know about our Lightning disk access speedup software that was awarded PC Magazine's Best of 1986 award (see box). After the smashing success of Lightning, in late '86, we

rt, no speedup board cuts disk LIGHTNING

"Lightning is almost mandatory...." -Steve Manes, PC Magazine

Best of 86 review Loads with the DOS - always ready as a background program to accelerate disk access. You do nothing everything is automatic. Programs that frequently access the disk (hard or floppy) are made instantly up to 2 to 4 times faster. Uses a principle greatly enhanced from mainframe technology called caching. Fully ex-

ploits Above Board memory. LIGHTNING is the standard against which all our competition measures itself because we achieve universal compatibility with other software. Data is never lost, Order LIGHT/NING separately or get it free with your Breakthru 286 board.

guaranteed the Breakthru 286 board to be terally the most advanced, fastest, most feature-rich board available. The runaway success it has enjoyed truly proved that assertion. Now we go ourselves one better with the Breakthru 286-12. This new board has the clock speed cranked up from 8 to 12 MHz for speeds up to 10.2 times faster than an IBM PC. It is 50% faster than an 8MHz IBM AT, and up to a whopping 1,000% faster than a regular PC

HERE'S WHY THESE TWO BOARDS ARE SO SPECIAL

First, they install so easily. A half-slot card means you don't even have to give up a full slot. What's more, unlike competing

products it works in the Compaq Portable and most clones. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, they are advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that is faster than the one found in the AT. Has a 80287 math coprocessor slot for numeric intensive applications. A 16K cache memory provides zero-wait-access to the most recently used code and data. Speed switching software allows you to drop back to a lower speed on the fly for

timing sensitive applications.

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. Our boards operate with LAN and mainframe communication products and conform to the Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Faster and smarter than an AT - PCSG guarantees it.

Fourth, these are the best. There are several other boards on the speedup market. We at PCSG have compared them all, but there simply is no comparison. Many cards offer only a marginal speedup in spite of their claims and others are just poorly engineered.

We are really excited about these products. PCSG makes the unabashed statement that the BREAKTHRU 286 card represents more advanced technology

than boards by Orchid, Quadram, P.C. Technologies, Phoenix...we could go on. Breakthru 286 is undisputedly the turbo board with the biggest bang for the

buck. And we include FREE the \$89.95 acclaimed Lightning software. Call toda with your credit card or COD instructions and we will ship your card the very next day.

Think Agair

DON'T TAKE OUR WORD FOR IT, USE EITHER BREAKTHRU 286 SPEEDUP BOARD FOR 60 DAYS. IF YOU ARE NOT TOTALLY SATISFIED SIMPLY RETURN IT FOR A FULL REFUND.



PERSONAL CONTRUIFR SUPREMICAL DI

11035 Harry Hines Blvd. • Suite 206 • Dallas, Texas 75229 • (214) 351-0564 CIRCLE 489 ON READER SERVICE CARD

Lucid 3-D[™] is the best spreadsheet you can buy.

Don't take our word for it. Use Lucid 3-D for 60 days. Return it for a full refund if not completely satisfied. Plus, instead of the \$199 list price, an introductory spreadthe-word price of \$149.



Winner of PC Magazine's 1987 Award for Technical Excellence

Lucid 3D is priced to sell at 5199. but we want thousands of people using Lucid evenyday all over the world. We vivile you to be a part of that group. The reason we are offering Lucid for only \$149, on a sixty day return for a full retund, is simple. Preliminary user testing of the product produces the same results over and over. People tell us they would neeve work withou Lucid 3D again. Even folls continuing to work with 1e-3.

Memory Resident

That's because the idea of a memory resident spreadsheet makes sense, one that you can pop-up instantly while working in your word processor or any other program. Lucid lets you cut anything on the screen and past ir right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

Lucid 3-D was developed over the past two years with countless exhaustive hours of planning and programming to produce something spectacular. This is a product that works the way we dreamed a spreadsheet would function. Everyone who has seen it says things like: "Lucid 3-D is fine software from software of the 1990's will look and perform". Or even more to the point "This is the way I shought a computer should work". You'll see. Lucid is exciting.

Masterwork

We could go on at great length about all the features and innovations in Lucid, but Lucid is more than a bag of features. What is most important is the pride and craftsmanship that went into its creation. It is a masterwork. The overall feel is tight and polished. In fact Paul. Somerson, editorial director of PC Computing, used one word to describe it. "Silié?"

PCSG has built a reputation as a development laboratory producing products that you know are excellent. In 1983 PCSG dominated the Model 100 laptop market with ROM based software that every reviewer rated as



POP-UP 3 DIMENSIONAL SPREADSHEET

excellent. In 1985 we produced Lightning the pioneer and award winning Disk speed up software In 1986 we developed the Preakthru 286 accelerator board that blew everything else out of the water, and later we topped ourselves with the Breakthru 12. Now in 1988 those who have worked with Lucid 3-D tell us "you law done it again. This is software oremore should have."

For a limited time



Any cell can contain a com that you can acces



Fig. 1 Let's get the detail on those ad costs. Just move the widebar to that cell and press one key



corner showing we are on level 2. You can go Plus, no matter where you are on



Fig.4 Now, instantly we are on level 3. Each level is a different spreadsheet. You could now me to the New York Times and see the detail on that figure. There is

no limit to the levels you can go Move right down to transacti

What Makes Lucid 3-D So Special In the screen examples you can see Lucid is really three dimensional. Any cell of the spreadsheet can contain a complete other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that

All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Iim Seymour, the noted PC columnist, talking about Lucid in a recent article said that, "If there ever was an interface idea so good it quant to be stolen and widely used, this is it." What he was talking about is a

new menu approach that follows a simple design concept: it is easier to recognize than it is to remember. As choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.

a menu or what you are doing, just press function key F1, and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 600 topics and select the one you want.

Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write notes. memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

screen are completed. Other calculations you don't see continue on in the background during the next commands. The end result of this powerful combination is you rarely wait for a recalculation with Lucid You find out what instantaneous is all about.

"I've been calling it an 'Everyman's Spreadsheet', and I think that's how the market will position it. It's much more than an inexpensive alternative to 1-2-3." Jim Seymour, Columnist, PC Magazine, PC Week

Speed

Lucid 3-D is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only recalculates the specific cells that are affected by your change. This is called minimal recalc. Lucid also has a remarkable innovation called background recalc in which you are given control of the cursor the moment calculations affecting your viewing

Lucid Learns

Lucid 3-D also lets you teach it in any combinations of keystrokes so that involved sequences can be done with single keys. Plus more than just remembering keystrokes. Lucid allows you to create Macros with loops. procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is

olete other spreadsheet with a single key.



Fig. 5 Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levele as you like. No one else can do that.

The term of the te

Perfect letter we are writing. Dipboard Dump does it right now.

3-D has windows of user defined.

Name for Sharet Softs

| Processing on a quinterm for the date 1000 beings, processing of the pure with pure with processing of the pure with pure wit

Fig. 7 Here it is right in Word Perfect (or any word processor) just like you typed it. You can go the other way just es easily.

you can make your custom menus work like Lucid where one choice can take you down a level to a whole new set of choices. What's nice is that they will work from one spreadsheet to another.

Mouseability

Lindi 3-D was designed for both keyboard embasiss and mouse loves alike You can take your pick. Designed around the mouse from the ground up, the interface is smooth and natural. You select files to load from directory less. Everything is point and click. What's more any Lucid 3-D menu selection can be 'moused' and the seponse time is 'night row' inseat of the load of the of add-of mouse menu systems like those you've seen with 1-2-3. A window poos up with a library A window poos up with a library and the properties of the pool of pool of

of function names you can page through with he mouse Select click and it is in the formula with no typing required. You even have a label window that you can fill from the keyboard with favorite labels and names so that you can insert them later with the mouse. There's even a popup calculator to insert numbers so you don't have to go to the keyboard very often.

It really permits that feeling of becoming one with your work. Lucid range names as well as the macros named by the user that can be selected just by pointing and clicking, locus that are easy to grab with the mouse let you resize and move the spreadsheet window with the ease you would expect. Plus you can go anywhere on the sheet by moving the mouse and clicking on the spreadsheet booters. And remember, preadsheet booters. And remember, those features are done with or without the mouse easily and quickly.

Audit

When you are staking a big decision on information gained from a spreadsheet you need to be certain that you have made no mistakes. Lucid 3-D offers five audit displays and printouts.

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D without having to upset your present systems.

We are excited about Lucid 3-D.
But don't take our word for it, take
us up on our 60 day offer.

Call us on our order line number and we will ship your order the very next day. This S149 offer will end as soon as our dealer network is fully stocked. But in the mean time we invite you to try Lucid as part of our "gread the news" campaign, total pick up the phone and call us. We accept all major credit cards or you can order COJ.





Oracle Corporation, the world's fastest growing software company,' has just climbed past Ashton-Tate to become the world's largest supplier of database man-agement software and services.²

· Because ORACLE® runs on PCs. olus mainframes and minicomputers from IBM, DEC, DG, HP, Prime, Wang, Apollo, Sun, etc. virtually every computer you have now or ever will have. Ashton-late's dBASE runs only on PCs

. Because ORACLE is a true distributed DBMS that connects all your computers - PCs, minicomputers and mainframes - into a single, unified computing and information resource, dBASE supports

only primitive PC networking. · Because Oracle has supported the industry standard SQL language since 1979. Ashton-Tate promises to put SOL into dBASE sometime

in the indefinite future. · Because ORACLE takes advantage of modern 286/386 PCs by letting you build larger-than-640K PC applications on MS/DOS that run unchanged on OS/2, dBASE treats today's 286/386 PCs and PS/2s like the now obsolete, original PC

Don't go down in flames. Bail out from dBASE, Call 1-800-ORACLE1 and order your \$199-PC copy of ORACLE3 today. Or just ask and we'll send you information on ORACLE. the number one selling DBMS on minicomputers and mainframes.

Call 1-800-ORACLE1.

ext. 144 today. Dear Oracle

PC ORDER PROCESSING

20 Dayls Drive • Belmont, CA 94002 I want ORACLE to be THE LAST DRIMS for my 286/386 PC Enclosed is my
Check or VISA MC AM
Credit card authorization for \$199 (California residents add 7% sales tax). I understand this copy is for PC develop-ment only. Offer valid only in the US

Sirvet IPO. Bux numbers not acceptable

LETTERS TO PC MAGAZINE



BACKUP BACKFIRE

As I read your article on backup software ("Software Safety Nets," PC Magazine, May 31, 1988), I was trying to figure out exactly what criteria

you use when selecting an Editor's Choice



ease of use. You picked Corefast by Core International as an Editor's Choice even though it was mentioned that this program choked and was unable to restore data on a damaged floppy disk.

I have used Fastback to successfully restore disks that have been damaged after being used in a backup. Why would I want to trust a program that can't even figure out that a disk is damaged before writing data on it? I feel that the most important aspect of backup software is the ability to restore data; ease of use is strictly secondary. Apparently your editors don't feel the same way I do.

Kurt F. Wagner Delray Beach, Florida

I find it incredible that you did not select Fastback Plus as an Editor's Choice ("Software Safety Nets"). It passed all tests flawlessly. Carol Olsen Day called it the "ne plus ultra" backup program and generally raved about its features.

Even though it was slower than the two Editor's Choices, Corefast and PC-FullBak, Fastback Plus performed its primary function without any problems whatsoever-that is, it backed up and restored

all data files and directories correctly. In my experience with the program, it has never lost a byte of data, and it has exceptional error recovery.

The Corefast review stated, "Recovery and error handling . . . are this program's weak spots." The review also explained that the program will appear to put data on a had diskette and the user will not realize it until it is too late.

It is equally startling that you chose PC-FullBak, which failed your Scatter environment and which failed, in this case, to back up 2.5MB of your files and directories without an error message.

Tom Fleming Sarasota Florida

The excellence of Fastback Plus isn't in question. It has been in wide use for some time, and previous versions have also received good reviews.

The Bigfile and Scatter tests are designed to break software. Few users put backup software to such stress. But it's probably safe to say that all users should use backup software more-and more intelligently-than they do.

Corefast and PC-FullBak, with their interfaces and their features, facilitate ongoing intelligent use and thus were the Editor's Choices .- David DeJean

DATABASE DEBATE

The review of Advanced Revelation in your Project Database 3 article ("Programmable Databases: dBASE and Its Challengers," PC Magazine, May 17, 1988) absolutely astounded me. I have never seen a product review that was so

lacking in substance. What was said about the product was not nearly as important as what was not

said. The reviewer failed to mention that in Advanced Revelation, fields are variable lengths and can have multiple values. This feature sets it apart from other microcomputer databases. Anyone who has ever worked with variable-length fields would cringe at the thought of having the restrictions of a fixed-length environment imposed on them. In my opinion, this omission destroyed any credibility the review might have had.

Michael Langley Lilbum, Georgia

I want to compliment you on your latest review of database systems ("Programmable Databases: dBASE and Its Challengers"). Most of what I read seemed

incredibly accurate given the scope and complexity of the project.

Progress."





Friedlander's statement "Offered the choice of spending 20 minutes with the typical database screen generator or 5 minutes programming with Progress, I'll take

D. Ross Hunter Duxbury, Massachusetts

I enjoyed your recent feature on flat-file databases ("Flat-File Databases: Easy-to-Use Sophisticates," PC Magazine, April 12, 1988), especially since it included a

sidebar on "1-2-3 as a Database." However, your review missed the potential of Lotus 1-2-3 as a database by not

OUTSTANDING SOFTWARE





ı

п

For Ten or More SHIPPED WITHIN 24 HOURS!

ction Guaranteed or Money Back! **BUSINESS 1-EZ-FORMS** business form letion and printing program

CAD 3—The PC-Flow 1 0 computer eded flow chart generation program. Color graphics required COMM 4a,b,c,d,e-(5 deks) Jon the world of syspes with RBBS Bulleon Board System 14 1D DATABASE 18,b—(2 disks) Fre Express 3 8 menu driven general purposa database manager

EDUCATION 1 — Interactive DOS tutorial for new PC users. Makes learning DOS painless FINANCE 1a,b - (2 disks) PC Accountant 2 0 personal bookkeeping and finance management GAMES 1-3-D Pacmen Kong, Spacewar Jand-Joe, luturistic Flightmers and more. Color required

GAMES 2-Qubert, Pango, Carripede, dun-geons and dragons style Zoarra, etc., Color req. GAMES 3—Blackjack with customizable rules Armchair Quarterback (you call plays), and more GAMES 4—Star Trek, the Castle adventure game; and the original Colossal Ceives Adventure GAMES 5—The Hack adventure game from the universities. Like Rogue, only much richer

GAMES 6-Pinball, Othello, Dragons Sopwif-ifly a Sopwith Camel) and more. Color required INFO 1a,b—(2 disks) Cooking recipes database with keyword/ingredient retrieval. Add your own MUSIC 2a,b-(2 disks) PlanoMan 3 0 polyphonic erding and playback program ORGANIZER 1—DeskTaam, a Sideleck clone and the Judy personal colondar program PRINTER 1—Resident point control and fort

simulation 1—Maze making program, MiT's 2 simulation, starteds, etc. Color graphics req. & UTILITIES 1-A collection of invaluable general S utilities. An absolute must for all UTILITIES 2—More invaluable DOS utifies in-duding screen burnout, ram disk, and more UTILITIES 3—A comprehensive set of deb

NEW RELEASES UPDATES

BUSINESS 2—Expressgraph business graphics Chart your data and find trands. Color graphics req. CAD 1a,b—(2 disks) Fingerpaint 1 2 advanced painting and Atlantica object oriented dissign. Color CAD 2a,b—(2 disks) DanCad3d, an advanced 2D 3D drafting program witningston, 640K, color COMM 2a,b—(2 dieks) Procomm 2.42, an excel-lent modern program with terminal amulation EDUCATION 3-PC-Fastype 1.20 typing tutor, sere and orberned stud FINANCES 3e,b—(2 disks) Express Calc 3.12, a powerful and user friendly spreadsheet program. ES 8—Senker helicopter attack and Rink, the of world domination. Color required. MES 12—Backgammon (play the comput Wheel of Fortune based on the garmeshow

GRAPHICS 1-Record and play back screen im ages! Excellent for demo, etc. Color required. GRAPHICS 2a,b,o—(3 disks) An excellent 3-D surface modelling and shading program. Color INFO 2a,b-(2 disks) Zip Phone, national to zip-code cross reference

LANGUAGE 3a,b-(2 disks) The A86 3 09 macro assembler and debugger for 8088/96/286s SHELL 4a,b—(2 disks) Automeru and HDM II 4 04 hard disk prog_lor_custom tull-screen menu UTILITIES 5-Hard disk utilities for v 5—Hard disk utilities for venlying, fi ng and optimizing your disk drives

UTILITIES 6—Advanced unities including Mark Release (remova resident progs w/o reboot) UTILITIES 7—More edvanced utilities including Mesterkey (undeletes files from hard disks). WORD 1a,b—(2 disks) PC Write 2.71, a powerlu word processing system wispell checker, laser sup

software listed is shareware or user suc MicroCom Systems Cost of items \$3.00

3673 Enochs Street Shipping
Santa Clara, CA CA res tax
95051 Total encl. (408) 737-9000

LETTERS

looking at its expanded capabilities using the new 1-2-3 add-in products. The results of using these additions together with 1-2-3 leave many of the standalone products in the dust. I feel that as these capabilities become known, 1-2-3 will become a major systems product in the workplace.

Mark M. Williams

Kirkland, Washington

NEATNESS COUNTS

I just read your After Hours review of Tellstar (PC Magazine, May 17, 1988), and I had to laugh. I am referring to the sentence "Tellstar includes a hundredplus 'messier objects'

Those are supposed to be "Messier obiects." Charles Messier was a French astronomer who lived in the 18th century. He cataloged hundreds of objects in the night sky and gave them "Messier num-

bers" instead of names. If the mistake is Tellstar's fault, then Mr. Mendelson should have nut "Isicl" after "messier objects." The lowercase "m" seems to imply that some objects are

neat and others are messy

Berna Lowenstein Gainesville, Florida

Tellstar gets it right in the manual, and Mr. Mendelson got it right in his copy. The capital letter disappeared in the editing process, perhaps because we can't see much of the night sky through the dust and lights of New York City.

Looking at the After Hours sidebar on Thexder (PC Magazine, May 17, 1988), I thought that the picture of the screen was in Japanese. However, a closer look revealed that the photograph had been reversed and printed upside down. Are you trying to find out who really looks at your magazine, or was this an honest mistake?

Vernon Balbert Friendswood, Texas

Yes, the picture of Thexder was backward and upside down. We apologize for this error; our editors were worn out from examining Tetris and couldn't focus properly.

ECONOMICS 101

In his column "Who Took the 'Personal' out of the PC?" (PC Magazine, May 17,

1988), John C. Dvorak mistakenly asserts that the "personal" in personal computing is being stolen by villainous management decisions

The shape of computing will be determined by which technologies, large or small, can put out the most useful power for the smallest price (supply), It will also be determined by the value of coordination imposed from the top versus the value of freewheeling initiative (demand).

We can see in the market the falling value of coordination imposed from the ton. By 1985 the percent of the work force with firms employing more than 500 people was down from 27 percent to 22 percent and falling. In contrast, several hundred employees at WordPerfect Corp. in Utah produce what is arguably the best word processor in the world. Firms can empower their employees, or

they can start to look for bankruptcy lawyers. The personal computer has not yet begun to fight.

Allen Stoltzfus Harrisonburg, Virginia

A WORD FROM OVERSEAS

As an expatriate, I feel slightly cut off from the mainstream of U.S. activities, but PC Magazine always puts me back in the picture

Your Productivity section has become indispensable, and hardware and software reviews guide me in the purchase of new products. For entertainment, I chuckle over the tongue-in-cheek columnists.

Congratulations on a fine publication. Count me among your fans. Dr. Lebius Matthews

Wettingen, Switzerland

CYCLE CONTROVERSY

Interestingly enough, both John C. Dvorak and Fred Heutte are misinformed with respect to solar physics (Letters, PC Magazine, May 17, 1988). Dyorak claims that the sunspot cycle is 22 years; Heutte responds that the solar cycle is 11 years. In fact, the solar cycle is 22 years and the sunspot cycle is 11 years. You see, because of the differential rotation of the sun, the magnetic field lines, which start out in one polarity . . . oh, never mind.

John Mallinckrodt Claremont, California

WHAT THE THE EXPERTS SAY ABOUT Page Perfect*

"PagePerfect integrates file management, word processing and page layout in an exciting way, its file management operating shell is spectacular . . . The best I've seen. The page-layout and word-processing functions are superb too." John Dvorak, San Francisco Examiner.

"If it is true . . . that what people want to do is use their desktop publishing program to both create and format their documents, then PagePerfect is just about their only choice . . .

On a feature list, the difference between PagePertect and either PageMaker or fentura wouldn't appear to be great. But when you sit in front of the program, what you get is an experience that starts with word processing and then gives you access to page composition features.* Stuart Aleop, PC. Letter.

*PagePerfect offers a combination of word processing and desktop publishing that's hard to beat. PageParfect lefs you create professional looking letters, proposals, newsletters and memos . . . in minutes, not hours! At a price of \$495, you can't go wrong by listening to the experts. Call IMSI today for the dealer nearest you (415) 454-7101, (800) 262-4723.

or (800) 562-4723.

Few programs that harbor such power are as easy to use. WordStar and MultiMate commands are supported



Where We Stand On Accounting, Eight years into it and firmly planted. With our experience and knowledge we have created a new foundation for over 70,000 businesses worldwide. And now, you might say we wear a bigger pair of shoes. Because we write accounting software that's more than just a tool for accountants. Our Database Accounting Library" is designed from the ground up to run an entire business. A system that everyone in a business can use,

A system that everyone in a business can use, on just about every computer or network. It's written in dBASE. The most accepted business programming language in the industry. Providing the power and flexibility that enables your information to achieve its maximum potential.

A financial system should grow as your business grows and be able to fit the specific needs of that business. No matter what type of business you're in. The Database Accounting Library includes the

The Cure for MacEnvy.



For years PC users have been conditioned to think of their computers in certain terms. Dependable, Versatile, Dull. To get superior graphics, some chained that you need a different type of computer altogether. They said their computer was everything the PC wasn't. Easy to use. Graphically exciting, Fun. PC owners were, well, green with MacEnsy.

Enter Micrografx.

With the Micrografx family of applications, you don't have to trade in your PC. Micrografx software turns a basic drawing program. And Micrografx software supports hundreds of printers like HP's LaserJet™ and Paintlet,™ All PostScript™ devices, too.

And there's more. Micrografix ClipArtTM libraries contain volumes of professionally designed symbols and illustrations. Micrografix ConvertTM translates between the PIC and DXF file formats.

So take a bite out of the argument that PCs can't do superior graphics, and get the cure for MacEnvy. Ask your dealer for a demonstration or call us for more

■ LETTERS

MARKET FOR UNIX

Your magazine claims to be the "Independent Guide to IBM-Standard Personal Computing," but do you not have a duty as an independent guide to open both your

If Southerners don't

"cotton to" yankees, then I wonder why there is such a constant migration of people and jobs from the North to

the South?

editorials and your testing labs to new standards in the microcomputer industry that may be affecting your readers?

How about some focus on Unix, the truly powerful, well-supported, multiprocess OS that more and more old PC users are switching to in light of the fact that DOS was never designed to handle multiple tasks and OS/2 is a new, unetsed, and immature product? How about some reviews of Unix workstations, which are now widely used by those who would have employed an AT a vear aeo?

Perhaps your reviewers and technicians could evaluate Unix software and the hardware that supports it, and perhaps then your clearheaded columnists could lend us both their opinions and their advice on this important subject.

> Bill Breck Bloomington, Indiana

NORTH VERSUS SOUTH

I take exception to the regionally stereotyped slur in John C. Dvorak's recent luside Track column, where he stated amid comments concerning a potential move of IBM to Atlanta—that the South is "just little towns peopled by all sorts of characters, few of whom cotton up to them IBM vankes." (PC Maagine, May 17.

If Southerners don't "cotton to" yan-

kees, then I wonder why there is such a constant migration of people and jobs from the North to the South? James Leonard Hobby

Lewisburg, Tennessee

The reason for the "constant migration" is that you can't get good barbecue north of the Mason-Dixon line.

John C. Dyorak

JUST THE FACTS

When I first started reading PC Magazine several years ago, your articles seemed unbiased and factual. In the past year or so, however, it seems that all you can write about is how bad IBM products are.

In reading a new product review, one only needs to read the first paragraph (even with the manufacturer's name deleted) to know whom you are writing about. As this is a new product, I would like to know its features and not your opinion about the product.

This "IBM bashing" seems to permeate most of the other areas of your magazine, also. I would like to see future issues of your magazine editorialize less and present the facts more.

Kerry Q. Cole Leawood, Kansas

CORRECTIONS/AMPLIFICATIONS

SuperProject Expert/2 (First Looks, PC Magazine, May 17, 1988) does not offer LAN capability through LanPaks, retailing for \$695. The OS/2 LAN is not yet available, and no price has been determined for the OS/2 LanPaks.

In our review of portable computers ("Planes, Trains, and Automobiles: 12 Portables for the Road," PC Magazine, March 29, 1988), the caption beneath the photograph of the Toshiba T1200 incorrectly identified it as the Toshiba T1000, and the caption beneath the T1000 identified it as the T1200.

HOW TO WRITE TO PC MAGAZINE

Send letters to PC Magazine, One Park Avenue, New York, NY 10016, or through PC MagNet. All letters become the property of PC Magazine and are subject to editing.

A Computer "Book" That Will Never Be Outdated

The problem with most books about public domain and shareware software is that they are usually outdated before they leave the printer.

To overcome this problem, we put the definitive Guide to Public Domain and Shareware Software on disk. This makes it easy for us to keep it updated monthly, and you can get free updates by returning the disks to we

The Public (Software) Library has for years been acclaimed by the national press as the most up-to-date, best organized library of PD/shareware available and this is reflected in the Guide.

But the Guide is much more than a catalog of the disks in the PsL. It is arranged by subject, from Accounting, Communications and Database to Statistics, Utilities and Word Processing.

Each section leads you to the specific type of software you need to solve your problems and then presents reviews of each of those programs.

Then you can order the disks for only \$5 each. Public domain programs require no other fee. The registration price for shareware programs is normally in the range of \$5 to \$50.

You can order the Guide now for just \$10, or you can find out more about the PsL by calling or writing for a FREE sample of our monthly newsletter and complete listing of disks in the library.

PUBLIC (software) LIBRARY

P.O. Box 35705 - PG Houston, TX 77235-5705 713-721-5205 or 713-721-6104 MC/Visa Accepted

Guaranteed Compatibility



PC BRAND 286/12 \$985

12 MHz, Zero Wait State, SI 15.3 LANDMARK™ Speed 16 MHz. 512K, 1.2MB Drive w/combo Controller, 101-keyboard:

- . 512K RAM Standard. Accommodates up to 4MB of RAM on Motherboard using 100NS, 1MB DRAM's
- · 1.2 MB Floppy Drive.
- Combination Hard Drive/Floppy Controller . 180 Watt Power Supply.
- Enhanced 101-Key AT-Style Keyboard
- OS/2° compatible today 100% IBM. MS/DOS, OS/2, XENIX, Novell, 3COM, and
- PCNET LAN compatible . Memory above 640K can be configured either EMS/
- Expanded, or Extended, by motherboard switch setting . 8 Slots (six are 16 bit). Clock/Calendar on board.
- · AT-Style Case with Keylock, Turbo, Power and Hard Drive LEDs. Small footprint case can accommodate up to four halfheight mass storage devices.

MONO SYSTEM...\$1059

EGA SYSTEM...\$1384

PC BRAND 286/20 \$1385

20 MHz Clock, Zero Wait State, SI 20.4* LANDMARK™ Speed 25.9* MHz.

512K, 1.2MB Drive w/ combo Controller, 101-keyboard. Your best low-cost alternative to a 386! Utilizes Chips & Technologies' Latest "NEAT" Chipset!

- . 512K RAM Standard. Expandable to 8MB of
- High Speed True 16 Bit Memory · Full 1MB available to DOS by BIOS REMAP
- 200 Watt Power Supply . Main board memory Above 640k can be either
- EMS or Extended by Setup · High Throughput Combo Controller
- · Enhanced 101-key AT-Style Keyboard . 100% OS/2, MS/DOS, XENIX and LAN compatible
- . Same full feature "baby" AT case as our 286/12 model above.

MONO SYSTEM...\$1495 EGA SYSTEM...\$1823

Performance information computed using Norton version 4.0 with our 286/20 configured with enough RAM to permit interleaving.

Save trouble. Save money.

Have it your way...PC Brand delivers what you really want, Superior quality, Exceptional savings, Custom configurations built to your exact specifications. Responsive toll-free service and support. Free freight. The best 5-Year Warranty in the business. And

a Money-Back Guarantee on every system we sell. Get more for your dollar. Call 1-800-PC-BRAND today. You'll even get a FREE GIFT...see our Free Mouse Offer

next page.



PCV20 AD-II

\$650

15 MHz, Throughput in an XT. Complete with Monographics Card & Monitor. 512K, One Drive, Mono Card & Monitor, 84 keyboard:

- . 512K RAM Standard, NEC V-20 CPU
- · One 360K Floppy Drive
- · 84-Key AT-Style keyboard 4-layer Motherboard expandable to 1 MB
 8 Slots, Built-in Serial, Parallel, Game Ports, Clock
- · Hercules Compatible Graphics Card
- 12" Monochrome Monitor · Accommodates up to 4 HH Mass Storage devices
- · AT-Style Case with Keylock, Turbo, Power and Hard Drive LEDs. Photo-illustrated Set-Up & Operating Instructions.

HARD DRIVE - Seagate ST225 20 MB Drive & Controller \$269 HARD DRIVE - Seagate ST238 30 MB Drive & Controller 295 MS/DOS, GW Basic ...

Color and EGA Models available...please call.

ADD A HARD DRIVE:

Enhance any 286 or 386 system with a hard drive:





☐ 40 MB 40MS Seagate ST251 HH □ 40 MB 28MS Seagate ST251 HH \$469 ☐ 80 MB 28MS Seagate ST4096 FH ☐ 110 MB 28MS RLL Miniscribe 6128 We offer a full line of standard drives from Maxtor, Microscience-Priam, Miniscribe, and ESDI Drives & Controllers. Please call.

Risk-Free 5-Year Warranty



Your Ideal Alternative to the COMPAQ® Portable III





INTEL-SBC386/16 \$1749 Portal

16 MHz, genuine Intel-manufactured system...the max in 386 performance. 512K, 1.2MB Drive w/ combo Controller, 101-keyboard:

- 512K RAM Standard. Certified 32 Bit 386 CPU.
 Expandable to 16 MB of 32 Bit Memory
- 1.2 MB Floopy Disk Drive
- 1.2 MB Floppy DISK Drive
 Combination Hard Drive/Floppy Controller
- 220 Watt Power Supply
- Enhanced 101-Key AT-Style Keyboard
 0S/2 * compatible today
- 100% IBM, MS/DOS, OS/2, XENIX, Novell, 3COM, and
- PCNET LAN's compatible
- · Socketed for optional 80387 co-processor
- Serial, parallel ports, clock/calendar standard
- Two 32-Bit Slots
 AT-Style Case with Keylock, Turbo, Power, and Hard Drive LEDs. Full size case accompdates up to 5 HH Mass Storage.

devices.

2 MB 32 Bit Memory Card

MONO SYSTEM...\$1865

EGA SYSTEM...\$2185

YOURS FREE!

A \$35 value...Free with any PC Brand aystem order of \$500 or more. Call today!

Take your choice. A Serial or Bushiouse. Offer good until, Sept. 30, 1988. If you do not qualify for our Free Mouse Offer, you may of course, purchase your mouse for \$35.



PORTABLE 286/12 \$1720

Portable 286/20...\$2020 386/20...Call 512K, 1.2MB Drive, Combo Controller, Backlit Display

We package the power and features of our desktop 286 and 386 Systems in a self-contained, light (20 lbs.), high impact plastic housing similar to the COMPAQe Portable III. All systems feature:

- 640 x 400 Backlit Supertwist LCD Display Made by SHARP
 Monographic & Color operating modes
- External Monitor Support. External Keyboard Port.
 5 expansion slots (3 long, 2 short)
- S expansion siots (3 long, 2 short)
 Accomodates two 5 1/4" or 3 1/2" Floppy or Hard Disk Drive
- 200 Watt 112/220 Autoswitch Power
 86-key keyboard Carrying Case with Strap & Storage
- Serial, Parellel, Game Port/ Clock Calendar Standard
 MB System: add \$225
 40MB System: add \$385

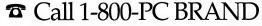
The 256K Chip Crisis: What You Can Expect.

What you've heard is true... the 256K chip crisis is real. Supplies are down. Prices are up. And there's no immediate relief in sight. How bad is it? Consider this: PC Brand has more purchasing clout than

relief in sight. How bad is it?
Consider this: PC Brand has
more purchasing clout than
most, yet we're paying 500% more for
256K chips today than we did just five

most, yet we're paying 300% more for 256K chips today than we did just five months ago. The future? Indications are it will be first-quarter 1989 before 256K chip production begins to meet demand

and production regims to meet certainian also hang in there. We'll all have to ride this out together. In the interim, be assured PC Brand will remain a leader in protecting your interests and assuring you the best quality products at the lowest possible price.



(Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX# 312-226-6841



PC Brand, Inc. 954 West Washington Street, Chicago, Illinois 60607 1-800-722-7263 Hours: Monday thru Friday 8 a.m. to 6 p.m. Central More Ordering Info on next page. VISA, MasterCard, Personal or Company Checks, and Approved P.O.s Accepted. Prices subject to change.

Shop PC-Brand Today...

Call

MONITORS

□ NEC Multisync II 14" Enhanced Graphics Color Monitor \$589 NEC Multisync Plus 15° Enhanced Graphics



☐ NEC Multisync XL 20° Enhanced Graphics 1024 X 768 res......2085

۵	Amdek 12" 410 Series Flat Screen TTL Monochrome \$149
0	Amdek 12" 600T Series Flat Screen RGB Color350
	Magnavox 12" Amber Mono High Resolution
a	Magnavox 14" Standard Color230
	Magnavox 14" Color Enhanced Graphics Display339
a	Mitsubishi 14" Diamondscancall
a	NEC Multisync GS 14" Monochrome "Grey Scale" 199
a	Princeton Ultra-Sync 14" Multi-Mode Enhanced
	Graphics Color Monitor520

Princeton 15" LM 300/LM 301 Desktop Publishing Display (requires special video card)...... Zenith Flat Screen Displays...

MODEMS



All	PC Brand modems are 100% Hayes* and IBM compatil	ile.
	1200 Baud Internal with free software	\$55
	1200 Baud External	
	2400 Baud Internal with free software	
	2400 Baud External	.150
0	Haves 1200 External	. 279
	Hayes 2400 External	420
•	Migent 1200 Pocket Modem with cables & software	60
	U.S. Robotics 9600 HST	.660

VIDEO CARDO

ď	IDEO CIRROS	
5	Monographics w/ printer Card, Hercules con	mpatible _\$45
0	Color Graphics Card w/Printer Port	40
ā	ATI EGA Wonder	185
9	ATI VIP VGA Card	260
9	Hercules "In" Color	
9	NEC MVA 1024	855
3	Paradise Autoswitch 480 Card	160
ā	Paradise VGA+	239
5	Princeton Laserpage for LM300	505
ā	Princeton Laserpage for LM300 Princeton Laserview for LM301	505
5	NEC GB-1 Multisync Card	225
ī	STB Autoswitch EGA	130
Ŧ.	Video 7 Vega	173
	Video 7 Vega VGA	268

CHIPS & CO-PROCESSORS

Due to current market volatility in RAM chips, we are unable to list our selection and prices in this ad. Call for price and availability.

DISK & TAPE DRIVES



u.	20 MB 65MS Seagate 225 w/X1 controller	\$269
а	30 MB 65MS Seagate 238 w/XT controller	295
а	40 MB 40MS Seagate 251	385
а	40 MB 20MS Seagate 251-1	469
а	80 MB 28MS Seagate 4096	670
	110 MB 28MS RLL Miniscribe 6128	
а	230 MB 25MS RLL Priam 230R2	2200
Ha	and Drive Cards:	

u	230 MB 25MS RLL Priam 230R22200
На	ard Drive Cards:
므	20 MB Seagate ST 125 High perform. w/controller \$299 40 MB Seagate ST 138 High perform. w/controller 380
Ca	Il for high performance Miniscribe, Microscience, Maxtor,

Floppy Drives:	\$75
3 720K 3 1/2" w/5 1/4" mounting for XT/AT	80
3 1.2MB 5 1/4"	90
□ 1.44MB 3 1/2" w/ 5 1/4" mounting for XT/AT	100
PS/2 Drives:	
CMS 5 1/4" external drive for PS/2	\$239
Tape Back-up Subsystems:	

□ 40MB DC 2000 Series with cartridge included	340
 60MB Maynard Maynstream portable tape backu 	D935
☐ 60MB Maynard Maynstream for PS/2	989
☐ 60MB Archive Internal or External	675
Iomera Remoullis:	

	A220H Dual 29MB Ex		63
۵	A120H Single 20MB E	xternal1	15
а	A210H Dual 10MB Ex	ternal1	39
а	B20M Single 20MB In	ternal11	19

INPUT/OUTPUT CARDS



XT-IO +II Card Parallel Port, 2 Serial Ports (One Stnd., One Optional), Game, & Clock for XT Systems.

☐ XT-2MB EMS Card..... Up to 2 MB Lotus/Intel/Microsoft Expanded Memory. AT-IO +II Card ...

For 286 & 386. Same as XT but without clock. ☐ AT-2MB Memory Expansion 2 MB Memory Expansion Card, can be configured as either as Extended, or Lotus/INTEL/Microsoft (LIMS)

Expanded Memory, 12 MHz, 0 wait compatible. AT Multifunction Memory Card Serial Port, Parallel Port, Game, up to 1.5 MB RAM.

CIRCLE 308 ON READER SERVICE CARD

Save Time. Save Money.

LAPTOP COMPUTERS



2	Toshiba 1000; 512K, 80C88 CPU576
2	Toshiba 1100; 640K, 80C86 CPU145
2	Toshiba 1200; 640K, 80C86 CPU, 20MBcal
3	Toshiba 3100/20; 640K, 80286 CPU, 20MBcal
3	Toshiba 3200; 1MB RAM, 80286 CPU, EGA, 20 MBcal
2	Toshiba 5100; 2MB RAM, 80386 CPU, EGA, 40 MBcal
2	Toshiba Add-on 5 1/4" External Drive38:
2	NEC Multispeed Linecal
1	Zenith Lantons Full-Line (2)

Call for info and prices on laptop peripherals and accessories! Don't forget to ask about our FREE MOUSE OFFER!

PRINTERS

- NEC P2200 The most popular 24-pin printer \$340 NEC P7 High capacity,
- NEC P9XL Top of the line matrix.....
 - NEC LC890 Postscript



3	Citizen 120D 120 CPS 80 COL Entry Level
3	Citizen MSP40 200 CPS Narrow320
	Citizen MSP50 800 CPS Narrow High Performance385
ì	Citizen Tribute-224 200 CPS 24Pin Wide Carriage 629
1	Diconix 150P Ideal for Laptops!309
ì	Diconix 300P 15" wide version of abovecall
	Hewlett Packard Laserjet Series 2call
3	Panansonic 1080I Ideal entry level printer
	Panansonic 1091IM2 Best selling nine pin!
	Panansonic 1592 High performance, wide carriage 415
3	Panasonic P4433 11PPM Fully HP CompatibleLasercall!
1	Toshiba Printers, Full linecalll

Custom Designs to Your Specifications! Volume Discounts Available!

Wide Selection, Name Brands - Low Cost We offer a wide selection of other name brand hardware and peripherals too numerous to list here. Call for details.

YOUR PC BRAND GUARANTEES

Free UPS Ground Shipping

All prices include UPS Ground Shipping or equivalent Or, we'll ship by the method of your choice. Federal Express, UPS Blue, UPS Red, at an additional charge.

Easy Payment Options

No Credit-Card Surcharges Charge your purchase to your VISA or MasterCard. There's no surcharge for using your card. Or pay by check or COD. Please allow one week for personal or company checks to clear. Purchase Orders accepted from major

corporations with prior credit approval. 30-Day Money-Back Guarantee

We aim to please. If, for any reason, you are dissatisfied with your purchase, simply return it within 30-days (in original packaging and as good as new) for a full refund.

5-Year Limited Warranty Protection

The best coverage in the industry...yours automatically. Warranty covers all PC Brand system motherboards, power supplies, RAM, keyboards and all expansion cards. 100% parts & labor are covered your first year. 80% parts year-2. 60% parts year-3. 40% parts year-4. 20% parts year-5. Additional extended-coverage contracts available for a fee. Floppy, hard disks and tape drives are covered for one year only. Complete warranty information available upon request. Manufacturer's warranty applies to all non-PC Brand products

Toll-Free Customer Service and Support

As a PC Brand customer, you'll be assigned your own personal PC Brand Consultant...a highly-skilled, technical expert who can help you solve a problem. Or prevent one from happening. Hours: Monday thru Friday, 8 a.m. to 6 p.m., Central Time.

☎ Call 1-800-PC BRAN (Call 1-800-722-7263...In Illinois, Call 312-226-5200) FAX# 312-226-6841





PC EXPRESS ACCOUNTING

BEDFORD ACCOUNTING



(Redford Software)

"The Perfect System for your Growing Business BEDFORD ACCOUNTING is a completely integrated accounting system that includes General Ledger, Payroll. Accounts Receivable, Accounts Payable Inventory and Job Cost. Use each module

as an independent software package ... or combine modules to form your completely nated accounting package BEDFORD allows for greater flexibility in your reports, supports a completely user defined chart of accounts, manual or computer produced checks (even for payroll), keeps track of full or partial payments by customers, allows

you to make full or partial payments to vendors, and offers quick pop-up capability to let you look up accounts and inventory informat The BEDFORD ACCOUNTING SYSTEM was judged to be PC Magazine's Editor's Choice in a review of S9 accounting packages conducted by Price Waterhouse. "This is truly a (complete accounting) system. Bedford's six modare easy to install, easy to use, and so well integrated with one another that it makes accounting a snap — even for non-accountants.
BEDFORD ACCOUNTING ... IBM VERSION.

BEDFORD ACCOUNTING ... MACINTOSH VERSION \$249 Peachtree Complete Accounting\$159 Dac Easy Accounting .

LANDLORD/LANDMASTER

"A Complete Property Management System — Easy to Use with Outstanding Flexibility." The LANDLORD is a complete property man agement system that prints tenant statements,

generates lease expiration lists, identifies late pavers, produces vacancy reports, prints checks and performs all functions required by landlords and anyone who manages apartments, condominiums. opping centers or any commercial properties

The LANDMASTER contains all the features of the LANDLORD plus adds a complete double entry nting system to the package for general

INCREASE

OFFICE

ROOUCTIVITY



TOTAL PROPERTY

FORMWORX (Formworx) "Create Any Business Form Instantly" The best package we've seen for generating

forms"...Compaq Magazine..."faster, easier to learn, and more versatile than the competition FORMWORX lets you create any form instantly. Using FORMWORX'S advanced drawing

tools, you can draw vertical and horizontal lines, boxes with dots, dashes or solid lines of various widths ... add heading and text using a variety of type sizes and styles ... and complete your form by adding any of 95 graphics fill patterns including shading and borders. FORMWORX outperforms all of the com FORMWORX WITH FILL AND FILE makes FORM-WORX into the most advanced productivity tool on the market. Now, you can actually make form overlays and

fill in all the blanks on your form. Save it, recall it, per form automatic mathematics and recalculations on your form...and, if you use dBASE, it's totally compatible. \$99.95 FOR MWORX WITH FILL & FILE

FORMKITS (70 or more professionally designed templates/package) Rusiness Forms \$39.95 Personnel Forms \$39.96 Project Management Forms \$39.95 Graphics & Charts Time Management Forms Sales & Marketing Forms. CIRCLE 301 ON READER SERVICE CARD

READY TO RUN ACCOUNTING (Manusoft)



that works under full control of Lotus 1-2-3. Purchase individual modules or the complete system General Ledder \$69.95 \$49.95 Inventory Control/Order Entry\$69.9 Complete System (all 5 modules)......\$199.95

RED CODE READERS

MICROBIZ RETAIL STORE/CASH REGISTER CONTROL (Microbiz Corporation)

The MICROBIZ RETAIL STORE SYSTEM is an extraordinary system for managing all retail store sales, customers and inventory. Quickly bill your customers, keep track of your inventory, commissions, look up prices, print cash register receipts (or complete invoices) and perform all the day-to-day functions required to keep you on top of your business and its cash flow. It's time t Optional add-ons to your Retail Store Software System ... a complete cash drawer that plugs into your IBM PC or compatible, a receipt printer and bar code reader

Systems are also available for Video Stores, Beauty Salons, Liquor Stores, Auto Repair Shops and other vertical markets.

Retail Store/Computer Cash Video/Liquor Store Management.. \$795 Register Software. \$399 Beauty Salon Accounting \$795 Bar Code Reader for Above \$595 The Auto Repair Shop

The Professional Time and

Rilling System for Anyone Who

Must Bill for Time and Service

used by more accountants. lawvers

Controller



equal to or better than packages selling for \$2000 and up. TIMESLIPS received one of INFOWORLD'S best ratings ever (9.3) TIMESLIPS is memory resident, offers a pop-up "stopwatch" to time phone calls and activities, generates transaction reports, client history, aged receivables and many valuable management reports. It interfaces with many software programs such as Bedford, Peachtree and DAC. You may even export data to otus 1-2-3 and dRASE, CREATE THE PERFECT BILL with TIMESLIPS III. TIMESLIPS III (for hard disk drive systems) ...

TAL (link TIMESLIPS III to other accounting programs) ... \$ 79.95 We are the experts in accounting software. Choose from over 100 accounts packages, and vertical market packages. Call for great values on DAC EASY, PERCHTREE and more than 100 other business, accounting and vertical mark

pocksyes.

Piecos call or strike for our FREE 48 page full color catalog containing mor film 100, 100 hordware and software items resig to be shipped. All prices and specifications one subject to change. Delivery subject to contiobility.
Add 56 for shipping of the first item 135 for each additional item).

C EXPRE OVERNIGHT

SOFTWARE DELIVERY

\$39.95

\$39.95 \$39.95

1-800-DIAL-PCX FAX: (914) 426-2600 TELEX: 667962 (SOFT COMM NYK)

PC ADVISOR



An inexpensive way to improve 9-pin dot matrix print quality, voice recognition systems that really work, and a keyboard that offers the best of two layouts.

MODEL 60 COMPATIBLE? I recently purchased an IBM PS/2 Model

60, DOS 3.3, billing software, and accounting software for my medical practice. I'm perfectly happy with the system, but I would like to do some of the work at home.

Is there a PC system currently available

that is PS/2 compatible but would not require the great expenditure of duplicating the Model 60?

Dr. Cyril M. Gostich Painesville, Ohio

It sounds as if you're confising software compatibility with hardware compatibility, Your Model 60 differs from the familiar PC, XT, and XT compatibles in a few ways. The most notable difference is the Micro C hannel architecture (MCA), 18M's new base design. The new basis not hardware compatible with the old, which means you can't pull an expansion board from an XT or an AT and expect it to work in your Model 60.

However, your Model 60 still runs DOS, and, more than likely, the applications you are running at your office are everyday DOS applications that can run on any PC-XT-, or AT-compatible machine.

If money is your worry, then your best bet is to buy an inexpensive, DOS-companible 286 machine. Peruse "The Cheapest ATs Ever" in the February 16, 1988, issue of PC Magazine for a collection of soild AT compatibles that list for under \$1,500.

If you insist on a machine that's hardware compatible with the Model 60, you'll have to wait for MCA-compatible machines to hit the market. Both Tandy and Dell have announced such machines, but neither had begun shipping as this issue went to press. Keep an eye on First Looks, where you'll find reviews of the products as soon as they begin shipping.

DOT MATRIX FACE-LIFT

I would like to jazz up the output of my old dot matrix printer. Do you know of any inexpensive font generator that can improve the print quality of a 9-pin printer?

Rachel Tortolini Cincinnati, Ohio

You need The Image Printing Utilities (Image Computer Systems, P.O. Box 647, Avon, CT 06001; (203) 678-8771]. As long as your printer is compatible with Epson dot martix printers or the IBM Graphics Printer, the Printing Utilities will tweek your 9-pin printer's output to make it look more like the output you get

■ The Image Printing
Utilities will tweak your
9-pin printer's output to
make it look more like
the output from a 24-pin
dot matrix printer.

from a 24-pin dot matrix printer.
The package works its wonders by caus-

ing more passes of the printhead across the page than usual for printing any one line. Depending on the print quality you choose, the Utilities will cause as many as six passes of the printhead. You choose from among 16 fonts by embedding a backslash followed by the font number in the document to be printed.

You can run the Utilities either in memory-resident mode or as a standalone application. In RAM-resident mode, the package occupies from 60K to 120K RAM, depending on how many fonts you have active at once.

One word of caution: this method of increasing print quality not only slows down your printer considerably while you use it but also increases the wear on your printhead and ribbon. This isn't a major problem, but you'll probably want to use the Utilities only when you need the improved print quality.

RECORD DATABASE

I have been searching to no avail for a software package specifically written to catalog phonograph records, audiotapes, and compact disks. I want to be able to store a wide range of information for each entry and then search the database.

Ed Goldberg

Long Beach, New York

Music lovers everywhere will appreciate For Record Collectors (\$129.95; Home-Craft Computer Products, P.O. Box 974, Tualatin, OR 97062; (503) 692-3732).

■ PC ADVISOR

The package allows fields not only for title. artist, and year but also for trivia such as pop-chart position.

You can search for recordings by your choice of 21 fields and even print the results of your search on 3-by-5 index cards for easy indexing.

As a final note, if your record collection is so large that you've decided to computerize, you'll probably need a hard disk to use this program effectively.

VOICE RECOGNITION

I have a real need for a small-vocabulary (300 words) voice recognition device. There used to be a few products of this type in the marketplace, but I have not seen anything of them of late. Do voice recognition systems of this type still exist, or have they proved to be too unreliable for everyday use?

> Tom Cook Montgomery, Texas

Voice recognition products are alive and kicking, stronger than ever. And although you must be careful to speak clearly when using a speech recognition system, you'll find that operation is 90 percent accurate or better once you've trained the system to

understand the words you want to use. For an overview of what the market has to offer and guidance on choosing a system, read "Voice Recognition: Understanding the Master's Voice," PC Magazine, October 27, 1987, where we look at 15 systems ranging in price from \$199 to \$8,995. Five of the systems reviewed offer

vocabularies of over 300 words. Two boast vocabularies of 1,000 words. HYBRID KEYBOARD I use my computer exclusively for word processing, and I have been looking for a

replacement keyboard that combines the best features of both the new 101-key keyboard and the old AT-style keyboard. 1 want the separate cursor pad of the 101 keyboard, but I don't want to give up the function keys along the left. Does anyone make such a keyboard?

Xavier Le Hericy Corvallis, Oregon

101 keyboard for its excellent feel. Northgate has since begun shipping the Omnikey 102 (\$89: Northeate Computer Systems, 13895 Industrial Park Blvd., #110. Plymouth, MN 55441; (612) 553-0111). The Omnikey 102 aligns the function keys along the left of the keyboard but otherwise follows the layout of the 101 keyboard. A \$25 PS/2 adapter is available.

Last issue, I mentioned Northgate's C/T

ASK THE ADVISOR

Send your questions to PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016. Please specify your equip-



ar Bridge Better? Because The Brooklyn Bridge that John Dvorak, PC Magazin chose as "The Best of the Best Utilities," now gives you more choices! Don't Tie Up Your Computer Sorting A Databasel RUN Gives You

Our DOS Utilities Guarantee

BACKUP, MOVE, REMOVE

and COPY save time by allowing

you to work with multiple files at

Fasier DOS Processing!

Twice The Power!

Brooklyn Bridge fea-

Our exclusiv

The Brooklyn Bridge Version 2.0 is more flexible than ever! We've always been the leading file transfer and access utility between IBM compatible microcon any size floppy or hard disks. Now we give your customers a choice between our file manager for the novice user or DOS commands for

the more experienced user Our new file manager lets you view both local and remote files at one time using a full-scree dual-directory display with 1-2-3" style menus. Or, you can still trans fer files and access peripherals using DOS commands at the commans line, within an application, or

within your current menu system One Printer Can Now Work For Two People! In addition to our menu system,

The Brooklyn Bridge lets you share printers and gives them access to other peripheral devices like tape back-up systems. CIRCLE 312 ON READER SERVICE CARD

BACKUP saves time by updating your disks quickly and backing up only files that have been changed or created since the last time your THE BRIDGE

BROOKLYN

ture, RUN, provides insure that deleted files are for dual independent unrecoverable. ing which lets you use both Now you know we have built a he remote and slave computers at

disk was backed up MOVE lets you work twice as

REMOVE has a security option to better Brooklyn Bridge, while still using the fastest attain transfer rate at 115,200 baud, and still saving your customers mo by eliminating the expense of an additional external di

fast by automatically deleting the

original once a file has been moved

If confidentiality is crucial,

The Brooklyn Bridge is available through your local dealer or directly from White Crune Systems Inc. For more information please contact Whate Crane at (404) 394-3119.

Just \$139.95!

WHILE COASE 1111181 Narrouss Cemps 30052

PC MAGAZINE . AUGUST1988

PREVIEWS

Discount

AT LEAST

EVERY DAY WE OFFER SOFTWARE AT THE LOWEST PRICES IMAGINABLE THOUSANDS OF SOFTWARE TITLES AT BIG DISCOUNTS! CALL US IF IT IS NOT LISTED HERE—WE HAVE IT!



HEW! K	OT! TITLES
SOFTWA	ARE FOR "IBM"
Abuse Fig. 101	\$158 98 37
Networker Plan 2.0 Norton Guidensor 0	174 194 OS/2 API 88
Page Perfect. Quick Basic 4 0 VP Planner Plus	371 56 0 94
Software	for "MACINTOSH
Lap Link MAC MAC SQZ	105
Timeslips III MAC.	149

CALL TOLL FREE

1-800-222-2665 IN CT. CALL (203) 359-1660

8:00 am-5:30 pm, Mon. thru Fri. Y YOU SHOULD ORDER FROM THE BOOK OF DISCOUNT SOFTWARE

25% or MORE Off List Prices on All Software ✓ NO HIDDEN CHARGES

No Shipping Charges on Cre-Card or Pre-paid Orders No Handling Charges Ever Credit Card Convenience

Your ONE SOURCE for

Thousands of Software Titl All at Discount Prices. 00K8 - 34

8-----PLEASE RUSH ME MY FREE C

ALSO! NEW

ok of Books" Cataloging 12,000 Scientific and Technical Books from 14 leading publishers.

Name	
Company	

PC 8/88 Or Send Business Card MAIL TO: OMEGA PRES

Eight Omega Drive, PO. Box 4182 Stamford, CT 06907 COPYRIGHT 1969 CHECAPRESS INC ALL BRINTS RE

WE HAVE THEM ALL! At OMEGA PRESS we strive to offer the very letest soft ges, including wirsion changes. At

WordPerfect



SFT NetWare v2.1 MIS-conceptions about

Traditionally, the MIS world has viewed PC-based local area networks with a healthy dose of skepticism. A "prove it to me" attitude. And in an arena ruled by powerful mainframes, that approach has given rise to a few misconceptions and doubts about LAN performance. Well, doubt no more, Because with the

industry standard SFT NetWare v2.1. Novell offers the LAN software powerful enough to convince even the toughest MIS skeptic. SFT NetWare v2.1 gives you the features

and functionality of mini/mainframe systems

at a fraction of the cost. With extensive fault tolerance, security and LAN-to-mainframe connectivity, it makes LANs advanced enough for major corporate, government and education installations.

No other LAN software even approaches the level of fault protection and data security built into SFT NetWare v2.1. Novell has pioneered LAN fault tolerance, and provides protection from failures in server hardware. In addition, enhanced security locks and passwords give you complete control of the information stored on your LAN.

pport

ant Capabilities

em Security

k Management Controls



SFT NetWare v2.1 simplifies network management with menu-driven utilities that let you control the network from any workstation. Advanced accounting features allow you to audit and account for users or departments utilizing network resources. Available communications links give you unsurpassed connectivity with mini/mainframe systems and other LANs. And SFT NetWare v2.1 supports OS/2 as well as DOS workstations.

To get LAN performance that raises your MIS standards, get the LAN system with no doubts about it—SFT NetWare v2.1. See your Gold Authorized Novell Reseller, or call 1-800-LANKIND.

For more information, call from your modem 1-800-444-4472 (8 bit, no parity, 1 stop bit) and enter the access code NV216.

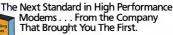


For network solutions, you should be seeing red.



One Good Standard Deserves Another

icrocom's AX moderns with MMP set the defacto industry standard for high performance. Now, we're about to do it again. Our new QXV322 makes your files fly across the line at speeds up to 38,400 lbx. You'll average enerly 30,000 lby on standard telephone lines. Quite simply, the QXV322 is the best price/performance modern on the Market. There's just one word for a modern this fast xx. EXHILARATHMENT.



The QXV.32c offers new MNP Class 9 and full duplex CCIIT V32 over 2-wire dia-lup lines. A V22 bis chip set is also included, 50 bit with a modern using slower modulation, it automatically negotiates the highest mutually supported speed, including V22bis, V22; Beil 272A and 103, and MNP classes 7, 5, 4, 3 and 2. A host of features are standard, including remote command sets, synchronous or asynchronous operation, and availability in stand-alone or rackmount vestions.

Microcom also offers two other QX modems: The new QX/12K, with MNP Class 7 for 12,000 bys throughput; and the new QX/30K, with MNP Class 8 for throughput to 30,000 bps. And our Carbon Copy Plus" PC communications software takes advantage of all the new QX Series features.

Call Toll-Free. Get The Standard You Deserve.



Workstation Connectivity Worldwide

1400 Providence Highway, Norwood, MA 02062 617-762-9310 Telex 710-336-7802

800/822-8224

360,000 bytes of data over

andard

Microcom Networking Protocol* (MNP) is a registered trademark of Microcol Hayes AT is a trademark of Hayes Microcomputer Products, Inc. Carbon Copy Plus is a trademark of Meridian Technology, Inc.

CIRCLE 388 ON READER SERVICE CARD



FIRST LOOKS

IBM Polishes the PS/2 Line, Adds Model 70, and Enhances Model 50

ANALYSIS

BY GUS VENDITTO

Fourteen months to the day after IBM Corp. added PS/2, VGA, MCA, and OS/2 to the vernacular, the company has filled gaps in the PS/2 line that had been evident from the start.

But if IBM was expecting to regain the technology leadership position it ceded when Compaq introduced its Deskpro 386 in September 1986, it fell short, IBM's fastest personal computer yet, a 25-MHz 386 with a static-RAM cache, won't ship until later this year; Compag shipped a comparable machine in June (see below).

And IBM did not introduce the widely rumored enhancement to DOS that would add a character-based menu system and an improved file system capable of addressing more than 32MB in a single volume. Instead. IBM reiterated its plan to deliver the OS/2 Presentation Manager and OS/2 Extended

Edition in the fall. An enhanced Model 50-the 50Z-is nearly ready to run OS/2. It comes with faster RAM (rated at 85 nanoseconds) than the original, loses a wait state (for zero-wait-state operation), and has a quicker, larger hard disk (42-millisecond access, rather than 80, and 30MB capacity, rather than 20). But with a maximum RAM canacity of only 2MB on the system board, and only three slots to accommodate extra RAM and other options, migrating to OS/2 on this 10-MHz 286-based machine is still likely to be a threeaspirin proposition.

Although IBM responded to popular demand with the 50Z, it did little to help out disappointed Model 50 owners. The same 60MB, 27-ns, hard disk sold for the Model 60 is now available as an upgrade kit for the Model 50, but as it carries a price tag of \$1,695, requires a Model 50 slot for its controller, and offers no way to salvage the original Model 50's 80-ms, drive, it's a poor choice.

Far more exciting is the crop of Model 70s announced. These desktop 386-based PS/2s are each housed in the same beieg box as a Model 50 and occupy the same 14- by 161/2-inch footprint. As a result, Model 70s in 16-, 20-, and 25-MHz configurations can accept only three Micro Channel add-in cards. but the two slower models can accept up to 6MB of 85-ns. RAM on the system board. The 25-MHz personal sizzler will accommodate 8 megs.

IBM's new Model 70s pack 386 performance into the same small chassis IBM introduced with the Model 50. The Model 70 comes in 16-, 20-,



Compag Deskpro 386 Climbs to 25 MHz

and 25-MHz ver-

HANDS ON

BY JOHN DICKINSON

Compaq Computer Corp. fell out of character with its 25-MHz Deskpro. For once, the everything's-faster-in-Texas gang wasn't the first company to announce the latest in 386 performance. Of course, shipping a machine is a bit trickier than announcing one, and the Deskpro 386/25 is characteristically Compaq in every way that

The new Compaq closely follows the design of the company's Deskpro 386/20, including Compaq's Flex Architecture. Flex splits the 32-bit memory bus away from the per-

inherals bus, allowing memory to be read and written at full processor speed while I/O peripher-

als run at a safe 8 MHz. The 386/25 also sports a 32K static RAM cache and, like its 20-MHz predecessor, employs an Intel 82385 cache controller to keep memory access times to a minimum. The standard configuration backs the 25-nanosecond static RAM with IMR of 100-ns. dynamic RAM, housed on the Deskpro's proprietary memory card. The card allows

expansion of up to 16MB The familiar Deskpro chassis houses either a 110MB, 25millisecond half-height hard disk or a 300MB, 20-ms, fullheight ESDI-controlled drive. (continues on page 36) HANDS-ON INDEX

IBM PS/2 MODEL 70s Down-sized 386 machines for the desktop IBM PS/2 MODEL 50Z

A more competent Model 50..... LASERTORO A print buffer worthy of your laser printers......43

FORGET-MF-MOT Schedules unattended program execution 43 FREEDOM MODEM

No phone lines 46 **WORDPERFECT 5.0** Bridges the gap between word

processing and desktop publishing48 PAGEMAKER 3.0

Adds professional publishin features

IBM PS/2 Model 50Z

IBM

(continued from page 33)

The top-speed Model 70-A21 further extends the design by adding a 64K memory cache and an Intel 8235 cache controller. This is the one area in which IBM has pushed the envelope. Intel² spee for the £2385 limits it to a cache size of 32K, and that's the size of the cache in Compaq's Deskpro 386/20 and 386/25. IBM engineers have enhanced the design of Intel's chip to double the cache size.

IBM didn't forget the bottom of the PS/2 line, but it didn't lavish too much attention there. You can now buy a 20MB hard disk for the Model 25 for \$795—\$100 more than you'd spend for a 30MB drive from CMS Enhancements. And if you were planning to install token-ring adapters in Model

25s, you can buy the system

The Minde Not Arright poils have the high and some time for any and required from data for TAME SAM, and Z for TAME SAM, and Z

preconfigured: the Model 25LS is a Model 25 with a network card and an extra 128K RAM.

IBM also reiterated its approach to what it calls "personal publishing" (and everyone else calls desktop publishing) by unveiling a 300-dot-per-

inch, flatbed graphics scanner capable of 128 levels of gray. The scanner will be available for \$2,395 in August and requires a \$950 Micro Channel adapter. Taxan's and Micro-tek's 300-dpi scanners cost about half that amount and work

with XT expansion slots, but they offer a capacity of only 64 levels of gray. One step above the IBM, Datacopy's 300-dpi Model 840 generates 256 levels of gray for \$6,800.

of gray for 50, 800.

In the best IBM tradition, the product premiers also brought price cuts to selected current models—selected for their slow sales movement. The cuts range from \$500 off a Model 60-071 to \$2,000 off the Model 80-311.

The cuts were not dramatic, but IBM has offered a new innovation—a trade-in-policy offering PS/2 discounts in exchange for used PCs, XTs, and ATs.

used PCs, X1s, and A1s.
Is all this enough to make the
PS/2 line worth the incompatibilities, the extra cost, and the
uncertainty of finding Micro
Channel adapters? Perhaps not,
but with these enhancements,
the limitations of the PS/2 are
vanishing and it's getting harder
to say no.

- +	PIE I		11	1			3. 1	1 1 1 1
	April 1987	Aug	ust 1987				June 1988	
Standard Features								
Model	List price	Bus type pro	Micro-	Clock	Memory	Floppy disk capacity	Hard disk	Displey
Aodel 25-001	\$1,350	PC expansion	8086	8 MHz	512K	720K	None	MCGA
Apdel 25-004	\$1,695	PC expansion	8086	8 MHz	512K	720K	None	MCGA
Aodel 25-L01 *	\$2,139	PC expansion	8086	8 MHz	640K	720K	None	MCGA
Aodel 25-L04 *	\$2,484	PC expansion	8086	8 MHz	640K	720K	None	MCGA
Model 30-002	\$1,695	PC expansion	8086	8 MHz	640K	two 720K	None	MDA, CGA
fodel 30-021	\$2,295	PC expansion	8086	8 MHz	640K	720K	20MB,ST506	MDA, CGA
fodel 50-021	\$3,595	MCA	80286	10 MHz	1 MB	1.44MB	20MB,ST506	MDA, CGA, EGA, VGA
fodel 50-031	\$3,995	MCA	80286	10 MHz	1 MB	1.44MB	30MB,ST506	MDA, CGA, EGA, VGA
todel 50-061	\$4,595	MCA	80286	10 MHz	1 MB	1.44MB	60MB, ESDI	MDA, CGA, EGA, VGA
fodel 60-041	\$5,295	MCA	80286	10 MHz	1 MB	1.44MB	44MB,ST506	MDA, CGA, EGA, VGA
Model 60-071	\$5,795	MCA	80286	10 MHz	1 MB	1.44MB	70MB, ESDI	MDA, CGA, EGA, VGA
dodel 70-A21¶	\$11,295	MCA	80386	25 MHz	2 MB	1.44MB	120MB, ESDI	MDA, CGA, EGA, VGA
fodel 70-121	\$7,995	MCA	80386	20 MHz	2 MB	1 44MB	120MB, ESDI	MDA, CGA, EGA, VGA
Andel 70-E61	\$5,995	MCA	80386	16 MHz	1 MB	1.44MB	60MB, ESDI	MDA, CGA, EGA, VGA
Aodel 80-111	\$8,995	MCA	80386	20 MHz	2 MB	1.44MB	115MB, ESDI	MDA, CGA, EGA, VGA
Aodel 80-311	\$11,995	MCA	80386	20 MHz	2 MB	1.44MB	314MB, ESDI	MDA, CGA, EGA, VGA
Model 80-041	\$6,995	MCA	80386	16 MHz	1 MB	1.44MB	44MB,ST506	MDA, CGA, EGA, VGA
Model 80-071	\$7,995	MCA	80386	16 MHz	2 MB	1.44MB	70MB ESDI	MDA, CGA, EGA, VGA



BY WINN L. ROSCH

If you like your 386 performance in a desktop box rather than a floor-standing tower. you'll be glad to know the PS/2 line now includes three desktop 386 machines-the Model 70s. Until now, the tower-chassis Model 80s were the only PS/2 machines built around the 80386 processor.

While the Model 70-A21. the fastest desktop machine made by IBM, stands in line with the rest of us awaiting a supply of 25-MHz 80386 chips, the \$5,995 Model 70-E61 and \$7,995 Model 70-121 are on

your dealer's shelves now. The chief differences between the two are microprocessor speed and disk capacity. The 70-121 runs at 20 MHz and uses a 120MB hard disk. The 70-E61 strolls along at 16 MHz and works with a 60MB drive.

Both are compact-51/2 by 141/4 by 161/2 inches (HWD)and based on a molded plastic chassis like that of the Model 50. The top of each case is steel. sealed well enough to earn an FCC Class B rating.

Inside, a snap-in tray holds all mass-storage devices-two 31/2-inch floppy disks (or floppy-controlled tape drives) and a single 31/2-inch hard disk Unlike the Model 50, the

Model 70s use hard disks with integrated controllers that connect to the system through a simple bus extension. All interface circuits-both host adapter and ESDI controller-are part of the drive itself. All drives slide into place without tools, using the same plastic mounting sleds used in the Model 50. The two hard disks are craft-

ed by IBM Japan, and both earn high marks for speed. The 70-121's stock disk scores a remarkable (for a 31/2-inch drive) 23-millisecond average access time in PC Labs benchmark tests. The unit in the 70-E61 is only slightly slower, turning in a 29-ms, average access time.

The system board of each Model 70 fills the entire bottom of its chassis except for the space occupied by the 135-watt power supply. Compared with that of earlier PS/2s, the number

of large custom VLSI chips is down-to three, including one for the built-in VGA circuitry. But the system board is covered top and bottom with a wealth of smaller chips, many of which bear the IBM copyright. Both Model 70s include a socket for

the 80387 math coprocessor. Besides the floppy disk controller and VGA, three ports are built into each system board-serial, parallel, and mouse. You'll find only three Micro Channel slots in each machine Two use the full 32-hit

memory. The 20-MHz 70-121 ships with 2MB of 85-ns, chips, Neither variety of chips is fast enough to operate without wait states, so memory banks are interleaved, resulting in operation that varies between zero and two wait states

Although they are the fastest IBM desktop computers, these lesser Model 70s deliver unremarkable performance when compared with the offerings of other manufacturers. Certainly both 70s are quick, but exotic memory-handling techniques give the ALR FlexCache 386, Everex STEP 386, and Compag Deskpro 386/20 a definite performance edge.

Only in the intriguing area of

used for the standard IMB of FACT FILE

> IBM PS/2 Model 20-E61 IBM PS/2 Model 70-121 IBM Corp.

Contact your local authorized IBM dealer. List Price: Model 70-E61 (with 16-MHz processor, IMB RAM. 60MB hard disk), \$5,995; Model 70-121 (with 20-MHz

processor, 2MB RAM, 120MB hard disk), \$7,995. In Short: These well-built machines offer respectable performance and IBM's Micro Channel architecture in a desktop box the size of a Model 50. Some users will require more than the three expansion slots these ma-

chines offer, however, CIRCLE 664 ON READER SERVICE CAR

All three Model 70s-at 16, 20 and 25 MHz-are built around the basic design first seen in the Model 50. Video SIMM RAM is one of the Micro Channel bus: one is 16-

bit with a video extension. With the wealth of built-in features and ports, many buyers won't find the small number of slots to be a problem. But if you're power-hungry enough to worry that you might need more slots, you probably will.

Three SIMM sockets are provided to accommodate up to 6MB of memory on either system board. These sockets accommodate either 1- or 2MB SIMMs. In the 16-MHz 70-E61, 100-nanosecond chips are extended-memory performance do the Model 70s excel. While most 80386-based machines are hardly faster than an AT when fetching and dumping bytes to extended memory, the Model 70s test as four times faster. When you take advantage of the extended memory-handling power of the 80386-with

OS/2, Unix/Xenix, or even an

space-savine techniques. 80386 operating environment

like Microsoft Windows/386the Model 70s come into their As with other PS/2s, the

Models 70 rate as some of the best-designed and -built personal computers you can buy. These are desktop computers for people who believe quality is as important as performance-and who are willing to make the move to the Micr

Deskpro 386/25 (continued from page 33)

The Deskpro 386/25 comes with six 16-bit AT-compatible expansion slots.

Other input-output equipage includes a standard 1.2MB floppy disk and an optional 31/2-inch 1.44MB floppy disk drive. Optional half-height cartridge tape

drives supply up to 135MB of backup storage. The base configuration includes one parallel and serial port, a security lock, a clock/calendar, and a beefy

220-watt power supply. The keyboard on the new Deskpro will come as a surprise to many of you used to the mushy feel of previous Compaq keyboards. Though made by Key Tronic-as were previous Compag keyboards-the latest version has a much clickier feel

than previous Deskpro and Compaq Portable keyboards. The design change is a welcome one, at least at this desk.

Like the Deskpro 386/20, the latest Deskpro also includes a socket for Weitek's blazingly fast math coprocessor and Intel's 80387. Whereas the old Weitek coprocessor comprised four distinct chips, the new Weitek design calls for only one, conserving the precious

system-board real estate. Also new is a big set of guns in Compag's file server arsenal: the 300/600 Megabyte Fixed Disk Drive Expansion Unit. The box, which measures about two-thirds of the size of a Deskpro system unit, can house two

of the 386/25's 300MB hard disks. Up to two of the expansion units can be attached to any model Deskpro 386. Fully load-

ed, the expansion units yield

1.500MB of 18-ms, disk capacity. If you're security-conscious, you'll be glad to know that the expansion units can be easily detached and wheeled away for safekeeping.

Alas, not new for the Deskpro line is the lofty pricing of the 386/25. The Model 110 goes for \$10,299, and the Model 300 for \$13,299. A VGA monitor and adapter will run you an additional \$1,298. The Expansion Unit with one 300MB disk drive lists for \$6,999, and a second drive will cost you \$6,499. That's expensive, even for this

kind of performance. Once past the invoice, however, you won't find much to complain about. The Deskpro 386/25 is everything you'd expect from Compaq. Whether it will be the fastest 25-MHz machine remains to be seen. In any case, it's fast enough.

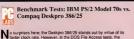
FACT FILE

Compaq Deskpro 386/25 Compaq Computer Corp. 20555 FM 149 Houston, TX 77070

(713) 370-0670 List Price: Model 110, with 110MB bard disk. \$10,299: Model 300, with 300MB hard disk, \$13,299; Expunsion Box with 300MB hard disk. \$6,999: additional 300MB hard disk

\$6 499: VGA monitor, \$699: VGA board, \$599. In Short: A 25-MHz desktop machine that offers industryleading performance plus plenty of room for growth.

CIRCLE 442 ON READER SERVICE CARD



records beyond the limits of their caching software. clock speed and memory access time while minimizing

Operation") machine code instructions in a big 128K logg w 80385 inelgation Mix benchmark test measures the time it takes to execute a selected series of processor intensive tesks. The test program uses 80386 instruction code. These instructions are a subset of the total.

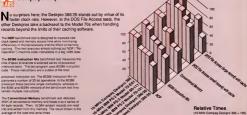
cessor instruction set. The 60386 Instruction plemente e number of 32-bit operations in the 80386 processor these become single instructions, whereas in the 8086 and 80286 versione of the benchmark test they

he Conventional Memory benchmark test elocates 256K of conventional memory end treats it as e series of average of the reed and write times

The DOS File Access benchmerk test measures the Proughout rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk tekes to perform common DOS file-management eed-ere timed and the results summed The test is carried out for two different types of files

small-record files and large-record files-that are used by common PC applications. Files created using small records are typically used by database management progrems, end lerge records are typically used for word processing and spreadsheet files. Loading a DOS ogram is elso simulated by the large-re

If no disk caching software is supplied by the compute



Performance Times (Times given in seconds)	NOP	80386 Instruc- tion Mix	Conven- tional Memory	DOS File Access (small record) with cache	DOS File Access (large record) with cache
16-MHz Compaq Deskpro 386	2.09	4.11	0.77	37.12	13.53
16-MHz IBM PS 2 Model 70-E61	2.09	3.90	0.77	43.99	8.10
20-MHz IBM PS 2 Model 80-111	1.65	3.24	0.58	39.18	6.32
20-MHz IBM PS/2 Model 70-121	1.65	3.13	0.61	39.54	6.49
Compaq Deskpro 386:20	1.65	2.91	0.41	34.22	9.64
Compaq Deskpro 386-25	1.32	2.36	0.39	30.70	4.98

LaserJet Breakthrough!



BASICS SANS Roman Avanti Helvette Gillide Rockland Olivia Chanctor Galax

Rockland Olivia Chuncler Galaxy BOOK FIXED Garamet Courti-Basque Prest Palatine Letter

Garamet Courier Basque Prestige Palatine Letter Gothic Centrum Line Draw

DECORATIVE Coop Storr Beget

Omi BASICS II Roman Italic Amertype I le City





See Glyphix quality for yourself. Our demo disk prints our newsletter and samples of all fonts on your printer. Send \$5,00 check or money order.

Glophes face disks contain
lase complete faces.

| Bank Set = 599.95
| Bank Jaces = 599.95

Glythic Fact Managers

are required for use with

She Sand

99995 Address __ 99995 99995 City _____

Company

Zip _____Tel. (______ lackade 55 till shapping and handling with your order Add 52-50 for second nem and each additional nem. All Swife products comer with 2 50 day, mounty back to

ORDER TOLL FREE

IN DELAWARE CALL (302) 429-8434

_ S ____

NEA ...

CIRCLE 299 ON READER SERVICE CARD

Faster, Leaner PS/2 Model 50Z



BY GUS VENDITTO

What a difference a wait state makes!

If you've already written off the underpowered IBM PS/2 Model 50, you'll have to get reacquainted with the Model 50Z-that's Z as in zero wait states, and Z as suggestive of a

sleek and responsive sports car. At \$3,995, the Model 50Z costs \$400 more than the original Model 50 and uses the same 10-MHz 286 processor. The additional \$400 buys you a perfor-mance gain of about 20 percent on memory and processor chores and a nearly 100 percent improvement in disk random

access PC Labs' BIOS seek test clocks the original Model 50 age random access time, but the Z's disk races in at a snappy 42 ms. The file access tests, which reflect actual data throughput during read and write operations, show throughput gains of only 14 to 35 percent. That's because disk caching helps the

original hard disk more than it helps the Z's. The additional \$400 also eets you a 30MB hard disk. rather than the 20MB model of

the original Model 50. IBM was able to remove the wait state from memory reads and writes by using RAM chips specced for 85-nanosecond access (instead of the 125-ns. chips used before) and by improving the design of the pro-

cessor support chip. IBM also managed to reduce the size of the Z's motherboard by about 40 square inches.

tion and use of SIMMs for video RAM. There's no clear advantage to the user, but it's an exciting sign of things to come and an impressive display of prowess by IBM engineers.

There were other small changes too Where the original Model 50 had two slots that each housed 512K SIMMs, the Z has one slot filled with your choice of a IMB or a 2MB SIMM. You can use the IMB SIMM on a Model 70 if you decide to upgrade to 2MB later (at \$1,395 for the 2MB option, you

may want to wait until RAM prices settle down). This isn't a total redesign of the Model 50, and so your upgrade ontions are still limited. If you plan to use OS/2 or any other memory-hungry software on the Z, resign yourself to using one of the three MCA slots for add-in RAM, because 2MB is



IBM PS/2 Model 50Z IBM Com Contact your local authorized

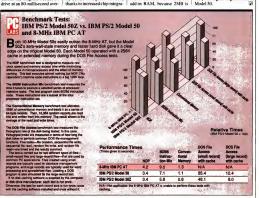
IRM dealer List Price: \$3,995 Requires: VGA-compatible In Short: A much-improved

monitor.

Model 50, thanks to faster RAM chios, zero-wait-state operation, and a 42-millisecond hard CIRCLE 443 ON READER SERVICE CARD

the system board limit.

If you are determined to purchase a Model 50, buy the Z: it makes good on the bright promise of the compact, integrated PS/2 design. But if you are looking for peak performance. set your sights higher than a



INCORPOLISION SALVINGE **OUTSTANDING PERFORMANCE!** FCC 'B' APPROVED

INFO 286 6/12 MHz System FEATURES:

or with 80287 socket Chips & Technology VLSI chipset Keyboard selectable 6/10 MHz or 6/12 MHz clock s

Expendeble to IMB on board, 640K base memory and 384K extension (512/512K optional) agal Award/Phoentx BIOS

No sockets for Chips & Technology ICs, direct chipset soldering for higher reliability Adjusted I/O bus speed for edd-on cards or *8 input/output slots (6 16-bits, 2 8-bits)

INFO 286 12MHz COLOR SYSTEM

COLOR I: \$1149

* S12K * 1.2MB TEAC Drive Dual HD/FD Control

200W Power Supply Specing Seving Case Clock/Calender with Bettery Back up

101-Key Enhanced Keyboard (Keytronics) * Color Graphic w/prin * SamSung RGB Monti

COLOR II: \$1385 W/ ST-225 20MB Hard Drive

COLOR III: W/ ST-251 40MB Hard Drive \$1595

* Up to 15 megabyte sys 8 megabyte EMS * Clock/Calendar with b

200W power supply (110-220V)

Support 360K, 720K, 1.2MB, 1.44MB disk drives
 Upgrade storage capacity by 20, 30, 40, 80 MB hard drives with WA2, NCL, RLL, controllers

INFO 286 12MHZ EGA SYSTEM

* 512K

* 1.2MB TEAC Drive * Duel HD/FD Contro

ce Saving Case ck/Calender with Battery Back up

101-Key Enhanced Keyboard (Keytronics) shanced Graphic Adap ickerd Bell EGA Mont

EGA II: \$1585 W/ST-225 20MB Hard Drive EGA III: \$1795 W/ST-251 40MB Hard Drive ... Tumediate

Delivery

Mega 4000 4.77/8 MHz System FEATURES:

* 8068-2 microp * Keyboard selectable 4 77/8 MHz sp * 4-layer mother board for higher relia * Expandable to 640K on board

* Eight expension slots that allow eas expansion by using optional plug-in card 150W power supply (110-220V) * AT style keyboard, 84 Key Keyboard * System packing box

SYSTEM UPGRADE OPTIONS

* ADD 128K * 1.2MB Teac Drive

* 360K Tene Debug * 720K Toshiba Drive * 2 Serial/1 Parallel

(2nd Serial Optional +\$25) * Evenex 1200 BAUD

INTERNAL MODEM * 2.5MB RAN CARD (OK)

* 101-Key enhanced Keyboard * Digital Display Complete 12MHz

INFO 286-12 Starter Package MONO-I: * One 1.2MB Teac Drive

* Dual FD/HD Controller * 200W Power Supply * Space Saving Case

* Clock/Calender With Battery Back up * 101-Key Enhanced Keyboard (Keytronics) * Hercules Compatible Mono.

Graphic W/Printer Card * 12" Monitor Packard Bell Hi-Res

MONO II: W/ ST-225 20MB Hard Drive ...

MONO III: W/ ST-251 40MB Hard Drive \$1419

MMMMM

wwwww OS/2 Compatible 3

SPECIAL OFFER

\$1349

286 System

WITH MONITOR (10 MHz Version Available)

-800-322-4 Mon-Fri 7:00 AM -6:00 PM Order Now! 9:00 AM -3:00 Pt

MEGA 4000 4.77-8MHz TURBO XT SYSTEMS: * 150W Power Supply * Floppy Disk Controller *AT Style Keyboard One 360K FLITTSU Drive

CIRCLE 102 ON READER SERVICE CARD We accept Visa, ManterCard, COD-Cashier's Check, prepayment, asserting and copensar POs accepted upon approval
 Chalf Residents and of Sasales and Sasales

IBM PC/XT, AT are the registered trademark of later

RETAIL HOURS MON.-FRI. 9:00AM - 6:00PM SAT.& SUN, 10:00AM - 4:00PM (714) 897-1562

The Component Wow Can Trust

MS DOS 3.3 WITH GW BASIC FOR ONLY \$79 WITH PURCHASE OF ANY SYSTEM

8210 Katella Ave. #D ONE Stanton, CA 90680 YEAR FAX: (714) 897-9173 TLX: 3720117 MAY

WARRANTY ON PARTS & LABOR

TECH SUPPORT: (714) 897-2037



PIPELINE

TOP TEN SELLERS

(A 5-week history) Quicken 2.0

PC Tools Deluxe Central Point Software

Carbon Copy Plus Meridian Technology Inc.

dBASE III Plus 1.1

Ashton-Tate Corp. Lotus 1-2-3 2.01

Lotus Development Corp.

The Top Ten Sellers list ranks PC business programs according to their sales performance in the last week of a 5week period. It also tracks programs' rankings (reading left to right) from May 2 through June 4. A 5-week history is charted to give a sense

of a program's sales strength over time. Dramatic shifts in a particular program's ranking may be the result of sales promotions conducted by individual retailers. Seasonal factors such as end-of-year-budget purchase decisions, can also play a large role in the performance of a particular program in any period. More than 12,000 individual locations contribute to the list.

here are lots of changes reflected in this issue's Top Ten Sellers list, including the way the numbers are compiled. In order to get the most accurate list possible, we're adding sales figures from PC Connection, the Marlow, New Hampshire-based mail-

order house. Although the origi-

nal source of

Copy II PC 4.01 Central Point Software Sideways 3.2

Funk Software Inc. Peachtree Complete II Peachtree Software Inc.

Harvard Graphics 2.1 Software Publishing Corp. The Norton Utilities Advanced Edition

Peter Norton Computing Rankings are based on net sales by unit; returns are subtracted from gross

our sales results. Ingram Soft-

ware of Buffalo, New York, is

probably the largest distributor

of software in the United States,

its sales don't always tell the

whole story. With the addition

of PC Connection, one of the

largest mail-order houses in the

country. Pipeline's Top Ten

Sellers will be even more repre-

to contribute to the list based on its high level of sales (more than

\$100 million annually) and its

broad inventory of popular software. The Top Ten Sellers will

now be a combination of

sales tallies from both courses

We selected PC Connection

sentative

Sales information compiled by Ingram Software Inc. and PC Connection Inc.



IN PERSPECTIVE

When we checked into desktop publishing use, we found that popular assumptions are accurate: PageMaker and Ventura Publisher are dividing the largest part of the market, and standard office projects, like newsletters and brochures, are the in tasks

For those who still think desktop publishing is a fad, consider this: of the 41 percent who said they don't currently use a desktop publishing program, 59 percent said they planned to get one. The survey polled 921 callers to PC Magazine's two electronic bulletin boards, PC IRS and PC MagNet,

Do you use or have you selected for your company a desktop publishing program?



The repercussions of the delay in shipment of Lotus 1-2-3, Re-lease 3.0, are starting to be seen. According to last year's plan. Release 3.0 would have beenout by now, but instead Lotus is hoping that Santa Claus will bring goodnews. Recent rumors of an interim version, Release 2.5, haven't helped end buyers'

doubts, either. Release 2.5 is said to include some of the features that Lotus is now trying to cram into Release 3.0 (such as Undo), but it would require less computing power and so would be more appealing to XT owners than Release 3.0. Right now, Release 3.0 code is too big to run within DOS's 640K limit. Lotus programmers are experimenting with overlays and optimization to make it work without losing features, but from all indications, Release 3.0 looks like a program that needs OS/2 to run at top speed-and that's not Lotus's intention.

Quicken, Version 2.0, the 550 checkbook manager, took over the number-one spot with surprisingly strong sales. Also doing well, Copyl IPC, Version 50, rode into the Top Ten on the strength of a new release that overrides some of the more recent copy-protection schemes.

Steady work continues be-



the Micro Channel, but much of the effort is now at the bargaining table. Dell Computer has agreed to pay IBM a percentage on all of its PCs sold-Micro Channel and PC bus-from now on. IBM will receive about 3 percent of Dell's net sales on all machines, with an additional percentage on Micro Channels when they're released. It's a major concession from Dell (formerly PC's Limited), but IBM had been asking for royalties on all PCs sold in the past, so perhaps Dell believes it was able to cut a better deal by settling before its competitors. Dell's probably hoping to gain access to IBM research, although IBM has stated that the royalty payments do not entitle licensees to

receive help in producing Micro

hind the scenes on the cloning of | Channel components.

Kaypro is now testing its own PS/2 clone, based on Chips and Technologies' PS/2 chip set, and the company was just sitting down with a team of IBM negotiators as this issue went to

press.

Dese it seem that every PC maker, from AST to Zenith, is presented by the present of the

Gallium-arsenide chips have been touted as the next breakthrough for computingintegrated circuits made from the compound can process in the compound can process incompound to the compound of the chips, but until now they couldn't be used in the same components with silicon chips unless there was a costly interface. Gazelle Microsystems of Santa Clara, Califf, says it's solved the problem and is about to start manufacturing galliumassenide PALs (programmable ased in PCS-lope) that can be used in PCS-lope) that can be

Gazelle's chip (the GAZZVI0) mimics silcon at the I/O level but runs at the speed of gallium-arsenide internally. The resulting performance boost could allow 360 PCs to be designed for speeds of 25 MHz and faster, without wait states. Current sillcon logic chips can't maintain that level (Compag and IBM are using hardware caches in their 25-MHz 386s to belie with brought and the silcon silco

Although Gazelle's patentedchips will cost twice what a comparable silicon PAL would, at 5.55 apiece they're still cheap enough to find broad acceptance by system designers. You could see them in a PC by early next year.

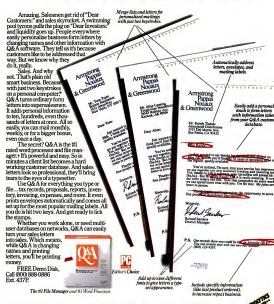
-Gus Venditto

Which desktop publishing program do you use?

What kinds of projects do you use desktop publishing software for?



SMART BUSINESS PEOPLE CHANGE NAMES OFTEN.



SYMANTEC. *Bervine 18th FC/XT/AT/FS/2 or competitive perman complete is Spitnere (19th of large of 18th Manager 648.8 ft Seap to 18th Office of 18th Manager 648.8 ft Seap to 18th Office of 18th Manager 648.8 ft Seap to 18th Office of 18th Manager 648.8 ft Seap to 18th Office of 18th Manager 648.8 ft Seap to 18th Office of 18th Office of 18th Office of 18th Office of 18th Manager 648.8 ft Seap to 18th Office of 18th Office

LaserTORQ: A Laser-Smart Print Buffer, and Not a Minute Too Soon



BY EDWARD MENDELSON When you bought your laser printer, you may have expected to keep using the software print spooler you were using with your dot matrix or daisy wheel printer. You used a spooler (or buffer) because it let you get back to work quickly while the buffer sat in your computer's memory and fed text to your slow-moving printer. You expected a laser to give you even faster printing-and were probably surprised to see your trusty print spooler actually cause your laser printer to slow down and get in the way of your applications. Spoolers aren't supposed to work this way, but most software spoolers aren't

designed to work with lasers. LaserTools Corp.'s \$99 LaserTORQ lets you print with a LaserJet or PostScript printer at the speed your old spooler should have given you but didn't. This package will transform even slow-printing desktop publishing programs into speed demons.

LaserTORO managed sig-

nificant speed improvements with every program I tried. A one-page Microsoft Windows file with four downloaded fonts can take 3 agonizing minutes to send to the printer with Windows' built-in spooler. The same file transmits in 30 seconds with LaserTORO

With Microsoft Word LaserTORQ typically cuts the time it takes to feed a document to the printer in half. Even applications like WordPerfect that

spoolers gain precious seconds. The program gets its speed from its ingenious interaction with the parallel printer port. LaserTORQ saves computer time by sending data to the port only when the port is ready to receive it. The parallel ports on the very earliest IBM PCs can't generate the information LaserTORO needs for this operation, so LaserTools sells a \$15

hardware adapter that solves the problem. LaserTORQ can also include respectable built-in work with serial ports, but it

f, i, *, or * to highlight option. DITES to select. DIC to backup. Fi for help

LaserTORO lets you set up your spooler in conventional, expanded, or extended memory, or on hard disk. The program can poll your machine for available resources.



LaserTORO LaserTook Corp. 3025 Buena Vista Way Berkeley, CA 94708 (800) 346-1353 (415) 843-2234 List Price: \$99 Requires: 19K RAM, HP-

compatible or PostScript laser printer, DOS 2.0 or later. In Short: The best print buffer for lasers. Not copy protected. CIRCLE 429 ON READER SERVICE CARE

won't give them the speed infusion you get with a parallel port.

LaserTORO occupies less than 20K of DOS memory. You can install a buffer of any size in EMS or extended memory or, for massive print jobs, on-disk. You can install the buffer in DOS memory if you don't have EMS or extended memory, but this reduces the memory available for applications

LaserTools also sells TORO, a \$79 buffer for dot matrix and daisy wheel printers. This is a stripped-down version of LaserTORQ, without the special optimization for laser printers. Both programs are lean, fast, and indispensable.

Forget-Me-Not Utility Puts Your PC to Work When You're at Play



BY DONALD B. TRIVETTE You may forget, but your computer won't-not if it's running Forget-Me-Not, the latest in calendar/reminder software. Besides reminding you of important duties and appointments, Forget-Me-Not's timerelease mechanism can execute any DOS command while

you're away from your PC. Forget-Me-Not monitors your computer's clock and keeps a file in which it stores your messages. When it sees | that you need to be reminded of something, it pops up a window on the screen with a message.

The package goes beyond simple reminders, however, by allowing a mixture of messages and DOS commands in your message file. Thus your PC can initiate backups at 4:30 in the morning or call another computer and download files while you're away.

Naturally, FMN works only when the computer is on, so you must leave it running or connect it to an appliance timer if you

FMN lets you change virtually every aspect of its operation by changing the contents of two files-the configuration file and the template file. The configuration file sets colors, window location, and a dozen other parameters. The template file es-

tablishes default values for different message types Forget-Me-Not uses about 30K for its memory-resident code. The current version can't make use of expanded/extended memory, but the developer

FACT

Forest-Me-Not Sterling Castle 702 Washington St., #175 Marina del Rey, CA 90292 (800) 722,7853

List Price: \$ 79,95 Requires: 30K RAM, DOS 2.0 In Short: A calendar/reminder

program that allows unattended execution of DOS commands. Not copy protected. CIRCLE 430 ON READER SERVICE CARD

promises that feature in the next version. The package supports both file server and fully distributed local area networks.

MICRO

Microsoft QuickC,

The best reason to go to C.

Microsoft QuickC is a powerful step into C programming It compiles at the blazing speed of 10,000 lines per minute. Its full-featured debugger lets you animate, singles step, and watch the value of variables change as you execute. And its seamlessly inte-

grated environment means you can edit, use the in-memory MAKE utility, compile, debug and execute your program without switching between tools. Its everything you need to make your program run

New QuickC from Microsoft.

LIST *99 **\$59**

Graphics

105 67 Excel

99

495 Call Quattro

199

269 299 Lotus

165 PFS: Pro Plan Plan Perfect

Lucid 3D

Worksheet Utilties

Boeing Graph

Deluxe Paint II

Draw Applause

GEM Draw Plus

Generic CADD Harvard Graphics PrintMaster Plus

reelance Plus

SPECIALS

Q&A by Symantec Voted PC Magazine Editor's Choice and PC



World's Best Buy, Q&A is truly the standard for easy to use data management. Its natural language interface makes you pro-ductive faster. Version

3.0 improves on perfection with greater speed, expanded lookup capabilities, optional network capabilties, and enhancements to the built-in word processor.

LIST 5299 \$179 FASTMICRO:

PC Tools Deluxe

LIST 179.95 FASTMICRO-



Take the best of X-TREE, NORTON and SIDEKICK and put them into a single, optionally resident program and you have PC Tools, Includes file undelete, accidental format protection, disk optimization, disk cache, a resident text editor and more. No wonder PC Tools is a two time PC Magazine Editor's Choice.

Databas			SOFTW	ÆΗ	ŀΕ	Utilities		
O.F.	LIST	FAST			_		LIST	FAST
Clipper	699	359	Integrate			CoreFast	149	87
DataEase	600	359	_	LIST	FAST	Desklink	170	95
dBase III+	699	359	Enable			Desaview	130	73
dBXL Diamond	199	109	First Choice	149	77	Formtool	95	54
Foxbase Plus	395	189	Smart System	895	427	HOT	179	99
Paradox	725	419	Works	199	117	Laplink	130	75
Quartz	795	449	Windows	99	59	Norton Advanced	149	74
RapidFile	295	169	Windows 386	195	117	PC Tools Deluxe	80	36
Rbase for DOS	700	419	WordPerfect Exec.	249	117	Relay Gold	250	139
Reflex	150	84				Sidekick Plus	195	119
Q & A	349	179	Mice			XTree	70	34
			Logitech C7 Serial/Bus	119	67			٠. ا
Desktop Publi			Logitech HiRes	150	85	Word Proces	sors	- 1
Byline	295	175	Logitech W Paint	150	85	4Word	100	55
GEM Desktop Pub.	299	169	Microsoft Serial/Bus	150	97	Easy Extra	99	50
Pagemaker 3.0	795	Call	Microsoft W/ Windows	200	129	GEM First Word Plus	199	117
PFS:First Publisher	99	55	PC Mouse	149	89	Manuscript	495	Call
Publisher's Paintbrush	285	149	1 0 1110000	143	03	Multimate Adv. II	565	247
Ventura	895	459	Power Prote	ction		Professional Write	199	105
			Curtis Ruby Plus	115	59	Rightwriter	95	49
Financia			Datasheild 85	90	50	Sprint	195	129
Bedford Integr. Acct.	249	149	Datasheild 100	99	57	Q & A Write	199	119
BPI		Call	Masterpeice	55	Call	Webster's Writer	100	59
Computer Associates		Call	Habita police		Oali	Word	450	Call
DAC 3.0	99	57	Programm	ina		Word Perfect	495	
DAC P/R 3.0	99	57	Macro Assembler	150	89	Word Perfect Library	129	Call 59
Dollars & Sense	179	99	Norton Guides	100	58	WordStar	350	Call
In-House Accountant	99	59	Turbo Basic	99	58		350	Can
Managing Your Money	199	117	Turbo C	99	58	Call On Non-Lis	tea ite	ms
Peachtree Complete	199	149	Turbo Pascal	99	58 58	TERMS: No Charge for Visa o	MasterCar	of Shin.
Timeslips III	200	119	Quick Basic	99	58 59	pune Charge: 3% (Min. S4). Pr	other were	anties &
· ····ourpo ···	200	. 15				I claims are handled by manufact	urer. All re-	turns are
Complian			Quick C	99	59	subject to 15% restocking fee, of	all for RA	number.

Spreadsheets

40

99

395

248

100

495

claims are handled by manufacturer. All returns are subject to 15% restocking fee, call for RA number.
COD's add 5% restocking fee, call for RA number.
COD's add 5% restrictions apply. Personal/company checks delay shipping. Compatibility not guaranteed. Prices/availability subject to change.
AZ orders add 6.5% tax. FASTMICRO is a service of Computer Systems. Contact fee. Call of Computer Systems Center, Inc.
For your protection, we check for stolen credi 59 51 cords.
Mailing Address:
3415 S. McClintock Dr., Tempe, AZ 85282
Order Processing/Technical Q's:
602-437.8975 189 119

ORDER LINE:

1-800-441-*FAST*

NEC P2200



55 cps in letter quality mode and has 360x360

dots per inch character resolution, sharp enough for even the most important reports.

LIST \$569 FASTMICRO: \$359

SPECIALS

Amdek 310A



since it was introduced. It has a antiglare screen across its 12" display. Its fully compatible with standard Hercules type monochrome graphic cards. Our buyers have outdone themselves to bring this model to you at an exceptionally low price.

FASTMICRO: \$69

Samsung S300

This PC/XT compatible gives you the benefits of a

clone without the risk. It comes with 512K of memory, a 360K drive, parallel and serial ports, an 84 key keyboard and a monochrome graphic card. It runs at 4.77

& 8mhz, has 6. expansion slots and includes MS-DOS 3.21 & GW Basic. Monitor not in cluded.

LIST'899 \$619

	PRINTERS			HARDV	VAR	F	Toshiba	LIST	FAST
Citizen		LIST	FAST	HALLEY	771		T1000	1149	769
120D		229	149				T1200F	2399	Call
180D		259	169	Genoa	LIST	FAST	T1200H	3499	Call
MSP Series			Call	Super EGA Hi-Res+	399	179	T3100/20	4699	2995
Tribute 124		699	449	Super VGA Hi-Res		Call	T3200	5799	3695
Tribute 224		949	599	Hercules			T5100	7499	Call
Epson		545	Call	Graphic Card +	299	173	Zenith		Call
Fujitsu			Con	VGÅ	399	249	Leintii		Oun
DL3400		995	549	intei			DISK DRI	VES	
NEC NEC		990	349	8087-2	250	149	Fuiltsu		
P2200		569	359	80287-8	410	249	250V Florey	119	77
P2200		799	Call	80287-10	480	287	360K Floppy 720K 3.5 Floppy	149	87
P5200		/99	Cali	Above Board 286	645	359	1.2MB 5.25* Floopy	149	87
P5300		1049		Inboard 386 1mb	995	749	Miniscribe	149	0/
P5XL		1295	Call	Orchid	550	145		400	240
LC890		4799	Call	Designer VGA	445	269	40MB AT#3650	499	319
Okidata				Tiny Turbo 286	445	269	Seagate		
182 Plus		319	229	Twin Turbo 12mhz	645	379	20MB XT Kit #225	599	267
292		539	359 339	Paradise	043	3/5	30MB XT Kit #238	699	287
320		499	339	Basic EGA	199	119	30MB AT #138	599	339
390		699	469	Basic EGA	349	149	40MB AT #251	899	349
393		1399	939	Autoswitch 480					
Laserline 6		1795	1299	VGA Plus	399	235	MONITO	RS	
Panasonic				5 Pack 0K	129	59	Amdek		
KXP1080i-2		299	169	Prometheus			1280	999	669 69
KXP1091i-2		329	195	Promodem 1200B	119	75	310A Limited Offer!	230	69
KXP1595		749	Call	Promodem 2400B	199	119	722 EGA	799	439 399 Call
KXP1524		949	Call	Promodem 2400G	249	159	732 VGA	625	399
Star		343	Oun	Std. Microsystems			Magnavox	04.0	Call
NX1000		289	179	PC110 PC210	295	149	Mistubishi		
NX2400		499	339	PC210	335	199	1409 RGB	399	259
NB2410		699	449	The Complete PC			1410 EGA	599	399
Toshiba		055	445	Answering Machine	349	219	Diamond Scan	799	485
P321SL		749	497	Complete FAX	499	319	NEC Scall	100	405
P3215L		999	655	Hand Scanner	249	159	Multisync ii	899	575
P341SL			939	Video 7			Multisync GS	279	189
P351SX		1499	939	Vega Deluxe	379	179	Princeton	2/9	109
				Vega VGA	499	259	Princeton	389	400
	BOARDS			Yogu YUA	433	200	Max15		189
AST			Call	LAPTO	PS		Utitrasync	849	479
ATI				NEC			Sony		
VIP VGA		449	259	Multispeed	1995	1099	1302 Multiscan	995 825	659
Everex				Multispeed EL II	2295	1449	1303 Multiscan	825	499
1200B Int Mi	odem	149	73	Multispeed EL II Multispeed HD	3695	2295	Thomson		Call
2400B Int Me		249	149	Sharp	3695	Call	Zenith 1490	999	599
EGA 640x48	30	199	139	Snarp		Call	Call On Non-L	sted It	ems
				Samsung		Call			

Freedom Modem: 4,800 bps with Error Detection. No Wires Attached



BY FRANK J. DERFLER, JR.
The Freedom Modem makes
data communication possible in
those instances when phone
lines just won't do.

Based on packet radio technology—developed by the Department of Defense for linking backpack and mobile computerized systems—the Freedom Modem lets up to 100 stations



transmit data on a single radio frequency.

You don't need expensive antenna towers to use the Freedom Modem, and you don't need to subscribe to a cellular telephone service. You do need an FCC license, however.

The maximum range of the Freedom Modem is only about 5 miles. Within that range, you can exchange data at up to 4,800 bits per second without inter-

connecting wires.

The Freedom Modem is only slightly larger than the Hayes modem and weighs 2 pounds. It has an RS-232C connector and an antenna connector on the

back. You can use the antenna as an 18-inch whip on the back of the unit for real portability or as an 84-inch outdoor antenna connected with coaxial cable for maximum distance. You can operate the modem from a 12wolk battery.

A processor converts the data stream from your PC into packets up to 1,010 bytes long. If the radio channel is free, it transmits the packet with the address of the station it is destined for. Each packet includes error-detection information, and bad packets are retransmitted upon

Because the Freedom Modem is a complex device, it requires a little programming. It can save its setup configuration, but you will want to create a script in your communications program to initialize the modem for the right address and com-

munications parameters.
The packet transmission
scheme is half-duplex. Unlike
typical telephone modems, only
one station transmits at a time
and it can take several seconds
to get a response. This half-duplex scheme works fine when
you want to send data in one di-

rection and can wait for an ac-

However, typical binary file-transfer protocols used in PC software expect a full-duplex channel. You'll need software with a "sliding-window" acknowledgment feature to handle binary transfers over these

While the error checking done by these moderms ensures that every character is good, in a noisy or busy system the throughput can slow considerably—a packet might take several seconds to get through. Considering the flexibility these systems provide, these are



Freedom Modem Commercial Resources Communications 400 S. Main St. Naperville, IL 60540 (312) 357-1800

List Price: \$1,850

In Short: A packet radio transceiver that offers wireless data transmission over several miles at speeds up to 4,800 bits per second.

CIRCLE 480 ON PEADER SERVICE CARD



A Behind-the-Scenes Look at OS/2

BOOK REVIEW

BY SALVATORE P. RICCIARDI

Software developers spend most of their time developing software. Occasionally there's a break for meals or sleep. All remaining time is spent reading programming books.

With so little time to devote reading, selectivity quickly becomes important. Inside OS/2, by Gordon Letwin, rates as a must-read for programmers or anyone else interested in the design of OS/2. Letwin is Microsoft's chief architect of systems software and the leader of Microsoft's OS/2 design team.
This is not an OS/2 reference

This is not an OS/2 reference guide. Rather, it is a book on theory and design. It provides a clear discussion of the major components of Microsoft's OS/2 operating system and how they interrelate.

Letwin divides the discussion into three major sections. "The Project" describes the history of MS-DOS and the goals and issues involved in the design of OS/2. Included is a chapter on "The OS/2 Reli-

goals and issues involved in the design of OS/2. Included is a chapter on "The OS/2 Religion," in which Letwin describes the four major architectural goals of OS/2—maximum

f | flexibility, a stable environment, localization of errors, and the software tools approach.

small limitations.

Part 2, "The Architecture," includes 17 chapters discussing each of OS/2's major components from a designer's perspec-

In the final section, "The Future," Mr. Letwin discusses future goals for later releases of OS/2, including an enhanced file system and support for larger hard disks.

The author has obviously expended a great deal of effort to make a highly technical subject understandable. If you're a software developer with an interest FACT FILE

Inside OS/2, by Gordon Letwin Microsoft Press 16011 NE 36th Way Box 97017 Redmond, WA 98073-9717 (206) 982-8080 ISBN: 1-55615-117-9 List Prices 19,95

In Short: A revealing look at OS/2 by the leader of Microsoft's OS/2 design team. CIPCLE 432 ON READER SERVICE CARD

in OS/2, or if you have an interest in operating system design, buy this book. FINISH FINANCIAL WORK FIVE TIMES FASTER.



ntroducing Quicken® Version 2absolutely the fastest, easiest way to write checks, keep financial records, track income and expenses, budget and manage your cash flow. It's ideal for business and personal use.

Now, Finish Financial Chores in Seconds.

Quicken completes your financial work 5 to 8 times faster than ever before:

- Analyze budget vs. actual expenses by month for 12 months: 4 seconds Look up a check you wrote 1000 checks
- ago: 1 second Write and print 20 checks and update all
- records: 3 minutes Compile an itemized list of tax deduc-

tions for the year: 3 seconds How can it be so fast? Quicken uses indexed files and speed-optimized C and assembler code - the very latest in

high-speed technology. So Automatic, It Eliminates Work.

Quicken's fully automatic "macrosi minate repetitious clerical work. Macros



Outcken remembers the bills you forget.

remember your bills, print your checks, and update all records automatically. All you do is sign the checks.

In fact, Quicken is so automatic it reminds you to pay your bills even if you forget to use it! Simply turn on your hard disk PC, and Quicken's pop-up Billminder" appears when you need to pay bills

No Need to Alter

Your Bookkeeping Procedures. Quicken is easy to use because it works just like your checkbook. There's no need learn anything new—no accounting jargon, no "debits" no "credits"

Quicken also comes with comprehensive on-line help, a complete manual, and free technical support.

Here's what the critics say:

"I've never seen such an easy-to-use manual or software that's so simple to use." Martin Blumenthal, inCider Magazine

"Extremely simple and fast."

Esther Dyson, Industry Analyst

"Absolutely the best small accounting program made." Boh Schwaback Universal Press Syndicate

New Features for Business.

Quicken provides special sections for businesses covering payables, receivables, cash flow forecasting, payroll, petty cash control and job, client, and property bookkeeping.

If you're a doctor, property manager, accountant, consultant, or manage any type of small business, and you write checks. Quicken will save you time and money starting today.

Free 30-Day Trial.

Try Quicken. If you're not 100% satisfied, return it within 30 days and pay nothing.

nn acom-varr Computibility: Exports data and reports in ASCII exports in Lotus* format with opnoral Trainese Utility bearer Computibility: All IBM* PC, AT,* PS/2* and antibles with 256K RAM and DOS 2.0 or higher All



Try Quicken for 30 Days Free! If not letely satisfied, return Quicken within 30 days for a full refund (including \$3.00 shipping and handling charge).

Or send coupon with payment to: Intuit, 540 University Ave., Palo Alto, CA 94301 ☐ Check enclosed (No purchase orders)
☐ Visa ☐ MasterCard ☐ Amex

Address. City_

Phone.

Quicken, \$49.95 plus \$3.00 shipping &

☐ 5½"disk ☐ 3½"disk ☐ Transfer to Lotus Utility (optional),\$19.95 Current Quicken owners—Call our 800 number for upgrade information.

W. DELIT KONS

WordPerfect 5.0: Was It Worth the Wait?



BY EDWARD MENDELSON
No matter how much you've heard about WordPerfect, Version 5.0, and all the unfamiliar powers it commands behind its familiar face, you probably haven't heard what's really special about it.

It isn't the new graphics capabilities, athlough Word-capabilities, athlough Word-Perfect Corp.'s \$495 flagship will replace dekkup publishing programs on many desktops. It isn't Word-Perfect's new way of handling printing, although Version 5.0 does tricks with printers that its rivals haven't even started to learn. Even Version 5.0 '50's flexible style sheets aren't the most important innovation, although the styles can include text and can build comically are supported to the style of the sty

mand, yet resilient enough to adapt to a different printer from the one for which it was intended. And because everything Version 5.0 needs to know about a document is in one file, a company can have a hundred different WordPerfect configurations on different desks, and the same file will print successfully on all 0 ftem.

Here's how it works. Let's say you've set your Laserlet defaults so that 10-point Times Roman is your "base font." A base font is the font that determines the relative size of other fonts in your file.

You then select the Large font for your headings (you can choose sizes ranging from Fine to Extra Large), and Word-Perfect automatically chooses the next-larger Times Roman font. If you decide to change the

program copy on which they

were created.
Version 5.0 imports images
in most standard graphics formats or captures images from
the screen. You can place
graphics at fixed locations on
the page, with text flowing
around them, or you can treat an
image as a character that moves
with the surrounding text.
WordPerfect handles color

with the surrounding text.

WordPerfect handles color
graphics as easily as black-andwhite.

While working on your file,
you might import a graph in the

you might import a graph in the form of a Lotus 1-2-3. PIC file. The complete graphics file, converted into WordPerfect's graphics format, is now part of the WordPerfect document. You no longer need to bother with the original file.

In the editing screen a blank box indicates the position of the graphic on the page. The print preview screen displays the graph itself. A graphics editing screen lets you manipulate the graph, but you can't directly modify the graph's contents.

WordPerfect also has a unique way of handling styles. As in Microsoft Word, if you created a default style library or a special style library for certain types of documents, you can use any style found there. You can also create styles specific to the document you are working on. Whichever method you use. you don't have to "attach" a style sheet as you do in Word. and you don't have to copy style sheets when you use the document on someone else's machine. Version 5.0 documents take their styles with them.

The exception to Version 5.0's everything-in-one-file rule is its innovative "master document." If you're working on ten chapters of a book all the chapters can be manageable, separate "subdocuments," which are listed in the master

enapters can be manageaute; separate "subdocuments," which are listed in the master document. Whenever you print the master document, all lists, page numbers, indexing, and cross-references to pages, notes, or tables will function as if all those separate documents were one file. With one command, you can select a family of fonts supported by your printer from a list of fonts on-screen. A kerning option lets you squeeze out excess space between letter pairs such as AW or PA, and you can adjust the amount of space be-

tween words

searches through all available fonts for the characters you need and can handle any of 1.500 predefined characters without forcing you to write a new printer diver—provided that your printer can print those characters. The page preview function quickly displays every detail of a printed page—or two facing pages—at up to twice full scale.

WordPerfect automatically

Version 5.0 adds a powerful macro language with variables, subroutines, and the ability to create custom menus that look and work exactly like the builtin ones. The macro language is woefully underdocumented, but some commented samples can be found on-disk.

Version 5.0's sereen is virtually identical to the uncluttered (continues on page 54)



WordPerfect, Version 5.0 WordPerfect Corp. 1555 N. Technology Way Orem, UT 84057 (800) 321-4566 (801) 227-4433

(301) 1227-4439 LLB Price: 5495; upgrade from Version 4.2, 560 (free upgrade for copies, purchase between February 1 and April 30, 1988). Requires: 334K RAM (512K recommended), two disk drives, DOS 2.0 or later. In Short: The most technically advanced word processor on the

market, with dazzling graphics, effortless printing, flexible style libraries, programmable macros, and all of WordPerfect's familiar case of

use. Not copy protected.

CROLE 432 ON READER:



document's base font to 12-

point Helvetica (which you can

do from a menu), all the head-

ings and footnotes change size

and style to match. You can

switch sizes anywhere in a line.

and the margins remain steady.

faults are set for I1/2-inch mar-

gins with justification off, you

won't have any problems if you

take your file to another mu-

chine where the defaults are set

to 1-inch margins and justifica-

tion on. Version 5.0 files carry

with them all the defaults of the

If your standard program de-

The WordPerfect preview screen provides WYSIWYG display of a single page at three 200m levels or two faxing pages in full-page mode.

plete document templates, including letterheads. What is special about the

new WordPerfect may not even be visible to the casual user. It's the way the program thoroughly reinvents the word processing document. With WordPerfect 5.0, a document is a complete and flexible system that contains more kinds of information than the documents created by any other program.

A Version 5.0 document is flexible enough to remodel all its type sizes with one com

New Disk Optimizer gives you the courage to say yes!

Introducing Disk Optimizer 4.0. Now with Data Guardian™ and Undelete.

It's the moment of truth. You've decided to erase an entire directory, and your computer asks, "Are you sure?"

Well! Are you! Is it he right directory? Will you ever want these files again? Enter new Bok! Optimizer 4.0 with Data Guardam. The only disk utility soft water that lext you blithely say "yes" now, and if you want, change your mind later. Because only Dato Guardam ensures that anyone can Undelete files, directories, even entire disks. And do it hours, days, up towesly later, no matter what else way've written town disk in the

Best of all, Data Guardian makes file recovery quick, easy and totally foolproof. Without the complexity of other data recovery software. And without the uncertainty. Thanks to Data Guardian, Disk Optimizer comes through for you every time.

You formatted what drive? That's fine for erased files, you say.

But what happens if you accidentally format your hard disk? No problem. Disk Optimizer comes through again with UnFormat that can instantly restore all the data on your disk to exactly where it was before that little slip of the finger on the keyboard.

And to make sure your data is really safe, the TrackSoure program proceeds the surface of your disk from excessive wear by periodically repositioning the head on your drive when it is tile. And the Refresh program prevents the bad spots that develop on disks due to fading magnetic charges.

Still the safest buy in performance optimizers.

As always, Disk Optimizer also gives you the safest, most advanced performance optimization available—proven by over a quarter of a

million users.
The Opimize
program speeds up
disk reading and
writing times by up
to 300 percent by undoing the file fragmentation that takes place
naturally over time. The
DOConfig program less you
arrange the layout of your disk
for best overall performance.

And the Analyze program gives you a graphical look at the condition of your disk, so you'll always know when it's time FREE SOFTWARE OFFER See Page 339 for detail

know when it's time to optimize again.

A total of 17 different programs.

Disk Optimizer includes Findfile for locating files by name or wildcard anywhere on your disk. Sorts for re-arranging files and directories in the way that

makes sense to you. Lock and Unlock for password-protected file security. Killfile for erasing sensitive data permanently. And lots more.

In all, there are 17 different programs in the new Disk Optimizer. Each one designed to improve performance,

guard your data, and make disk management easier and simpler for everyone. So get new Disk

Optimizer 4.0, and get more than the courage to say yes.
Get the peace of mind and onlidence that your disk is

total confidence that your disk is running better and safer all the time.

Disk
Optimizer 56995 Available at software dealers everywhere.
Or order direct by calling toll-free.
Soft Jone Solutions, Inc. One Perimeter Road.
Mars. hester, NHO3103.
(603-627-9900 in NH)

SOLUTIONS



If we don't have a Computer to suit your needs, you probably won't find it anywhere.

Model

386-2 16MHz

True 32 bit Memory and Intel 2 bit tested 80386. Compare

. 80386 Running at 16MHz and 1MB of 32 Bit Ram

 101 Enhanced Keyt Western Digital 2F-2H

Controller.

1.2MB Floppy Disk Drive
AT and OS/2 Compatibility
200 Watt Power Supply.

Socket for 80387

Opprocessor.

1 - 32 Bit Slot.

Model 386-8 20MHz

66 Running at 20MHz and

One of the lowest priced

*80386 Running at 20MHz and 0 Wast State
 *Sered Selectable for \$n8/20MHz
 *State Selectable for \$n8/20MHz
 *50 Per Selectable for \$n8/20MHz
 *10 Enhanced Keyboard
 *Western Oslate 28-24 Controller
 *1 24/8 Floopy Disk Drive
 *1 200 West Floopy Disk Drive
 *200 West People Supply
 *80287 or 80387 Copiscessor
 *1 -32 Bit 50387 Copiscessor
 *1 -32 Bit 50387

Model

386-6 20MHz

Truly one of the fastest 386 computers on the market. Even faster than the Compaq 386/20. Includes high speed SCSI Interface on the motherboard.

80386 Running at 20MHz and 0 Wait State
 1MB of 32 Bit Ram.

Up to 16MB of Memory on the Motherboard with

Up to teams of wembry on the Monerboard with using a single Sbt.
 Accepts 80387 Running at 20MHz.
 Accepts Wylek 20MHz Chip set.
 101 Enhanced Keyboard.
 Western Digital Dual Floppy and Dual Hard Disk

1.2MB Floppy Disk Drive.
 AT and OS/2 Compatibility.
 200 Watt Power Supply.
 Tower Cases Available.

Model 286-1 12MHz

\$1,095 Nearly as fast as many 386 computers.

· 80286 Running at 12MHz and

 BOODS Humang at 12MHz and 0 West States for 6T 12MHz.
 Speed Selectable for 6T 12MHz.
 State of 50NS Rem.
 Up to 1MB on the Momentoard.
 101 Enheroed Keyboard
 Western Digital 2F 2H Centrolle
 12MB Floory Disk Drive
 AT and OS/2 Competitivity
 200 Watt Power Supply
 Socials for 85287 Coprocessor. pield

20MHz Model 386-5 with Intel 20MHz 80386

60366 Purning at 16MHz and 0 Was Stele Speed Selectable for 47768/InMHHz. 1MB Stelec Cotumn Rem 101 Enhanced Krythourd Western Digital 22-24 Controlla 1,2MB Floppy Dask Draw Aff and 0.5/2 Competibility 200 West Power Supply 200 West Power Supply 80-32 of 80097 Coprocessor. 1–32 Bit Stele

386-4 16MHz

\$2,195 Compag compatible, accepts Compag 32 Bit Cards

> Model 386-7 24MHz

\$2,795

 80386 Running at 20/24MHz and 0 Worl State
 1MB of 0 Warl State Ram
 Up to 18MB everleble
 101 Enhanced Keyboard
 Western Digital 25-2H Controller 1 2MB Floopy Disk Driv AT and OS/2 Compatib 200 Wett Power Supply 2 - 32 Brl Stors

386 and 286 Portables with Gas Plasma screen in 640 by 400 resolution. Call for pricing on both 386 and 286 models.

DEALERS Competitive Motherboard Pricing

Hauppauge replacement boards for AT's. XT's, and PC's.

Always in stock-Call for pricing.



Custom designs to meet your specific

requirements. s a 30 day money back guerantee and a 1 year wenterty or All computer systems are assembled in the USA, burned in and fully tested before being shipped Master Card, Visa, American Express, end COD's accepted. Leasing aveilable with one dollar or 10% buy out at the customer's option.

All prices subject to change without notice AT, XT, PSI2, and Micro Channel are trademarks of International Business Machines Corp. OS/2 is a trademark CIRCLE 390 ON READER SERVICE CARD

NEW ON THE MARKET

Monitors: VGA from Hewlett-Packard, Flat Screens from Hyundai

Hyundai Electronics America is announcing three monochrome flat-tension mask tube monitors. The 14-inch HMM-1401 (\$159) and the 12-inch HMM-1201 (\$139) support Hercules- and CGA-emulation modes, with 720 by 350 resolu-

The 12-inch flat-screen HMM-1203 supports MDA, MGA, and EGA display modes and lists for \$159. The nonglare screens of all

three monitors are available in amber or naner white. Hewlett-Packard Co. is pushing the envelope in graphics subsystems with a VGA card (\$445) and monitor (\$695) combo that offers an 800 by 600 resBut-screen MONTROFT COME in amber. white.

olution mode with 256 simultaneous colors

The system has a screen refresh rate three times as fast as

that found on IBM's PS/2 VGA. according to HP. HP's VGA is downwardcompatible with EGA, CGA. MDA, and Hercules modes. It can display up to 132 columns

of text and has 256K of memory, expandable to 512K. Dot pitch is .28mm on the monitor tube. The controls for

are on a front panel.

HP is offering a \$530 HP

power, contrast, and hrightness A green, amber, or white monochrome monitor that automatically converts color modes to 64 gray shades is available for

TouchScreen Plus accessory for use with the color display

List Price: Wordhench, \$189.

by Michael W. Muchmore

List Price: Hyundai HMM-1401. \$159; HMM-1201, \$139; HMM-1203, \$159. Hyundai Electronics America, 4401 Great America Pkwy... 3rd floor. Santa Clara. CA 95054-(408) 986-9800

CIRCLE 436 ON READER SERVICE CARD List Price: HP Video Graphics Color Display: \$695: Monochrome Video Graphics Display, \$250: Video Graphics Adapter, \$445; TouchScreen Plus, \$530. Hewlett-Packard Co., Consumer Information Ctr., 19310 Pruneridge Ave., Cupertino, CA 95014: (800)

CIRCLE 437 ON READER SERVICE CARD

752-0900

Palantir's WinText. a Feature-Packed Word Processor for Windows Palantir is publishing WinText. full-featured word processing

software for use under Microsoft Windows WinText lets you work on four open files at a time. You

can cut and paste text or graphics between files with Windows' clipboard or with the word processor's "private" clipboard. The icon-driven program

features mail-merge, a 130,000-word spelling checker, auto-save, and a reversible Undo function that can back up 2,000 characters. Priced at \$350, WinText also

provides graphics integration with zoom, multiple headers and footers, full formatting with multiple rulers, and auto-hyphenation. Palantir says the program offers WYSIWYG displays, graphics, and four fonts in sizes from 6 to 36 points

Pull-down help with dialog boxes and macro capabilities are also offered by WinText. List Price; WinText, \$350. Requires: 512K RAM, one disk drive, Microsoft Windows, DOS

2.0 or later. Not copy protected. Palantir Inc., 12777 Jones Rd. #100, Houston, TX 77070; (713) 055,8880

CIRCLE 439 ON READER SERVICE CARD

Wordbench Targets Writers with Integrated Word Processor, Outliner, and Notetaker

Textbook publisher Addison-Wesley is shipping Wordbench. a trilogy of software tools tailored to the needs of students. journalists, and authors

The three main modules of Wordheach are an outliner notetaker, and word processor. Each module is dynamically linked, letting you transfer text from one to another

Outline headings can serve as titles for notes and can be merged into a document. The Reference tool and the Viewer call up windows over your current application. The Reference tool provides you with bibliographical or footnote-format information to be inserted, and the Viewer gives you a window to any text in any other module. You can apply the 60,000-

word Speller and 40,000-word Thesaurus to text in any module. An Add-in Manager gives you access to features like the Brainstormer, which facilitates writing by allowing you to scroll automatically, hide what you've typed, or set goals.

A Folder Manager allows access to all files on your disk and lets you change global format defaults. Wordbench has an auto-save canability and saves documents whenever you exit. A macro creator called Shortcuts saves you time with repetitive boilerplate text or com-

mand sequences.

Requires: 256K RAM, two 51/4inch disk drives or one 315-inch. disk drive. DOS 2.0 or later. Not copy protected, Addison-Wesley Publishing Co., Consumer Software Div., Rte. 128, Reading MA 01867; (617) 944-3700. ORCLE 435 ON READER SERVICE CAR



Wordbench, a \$189 integrated software puckage from Addison-Wesley, features a hotlinked word processor, outliner, and notesaker

NEW ON THE MARKET

More Paper Handling On Epson FX Printers

Epson America is coming out with two new dot matrix machines in its industry-standardizing FX line: the 80-column FX-850 (\$549), and the 136column FX-1050 (\$799).

The distinguishing feature of the new additions is their paperhandling capabilities. The printers can print on continuous-feed paper and switch to single-sheet paper without removing the fanfold paper. They also offer a short-form tear-off mode and micro-adjustment capability to reduce wasted paper and to facilitate printing

Epson's 80-column FX-850, a \$349 9pm dot matrix printer, sports improved paper-ha ding capabilities.



AT&T Introduces a 10-Mbps Twisted-Pair Local Area Network

Up to now, AT&T's Star-LAN transferred data at a rate of only 1 megable per second, white Ethernet coaxial cable networks offered 10-Mbps speed. Now AT&T has developed VLS1 integrated circuits that power the new Stat. AN 10the speed of Ethernet with the low-cost and simpler installation of twisted-pair. The new LAN supports OSI standards and is expected to ship early this

fall.
At the center of StarLAN 10 are \$1,895 Network Hub Units (NHUs) that connect up to 11 devices with twisted-pair wiring and allow connection of one

Etherner coaxial cable.
PCs are attached to the hub
through \$495 Network Access
Unit (NAU) adapter cards.
NAUs are available at the same
price for Micro Channel PS/2s.
Etherner or other coaxial devices require a \$200 Attachment
Unit Interface (AUI) to be attached to the twisted-pair ports.
A distance limit of 100 meters
(328 feet) applies to all devices
on the network.

The hubs can be connected to other hubs, bridges, fiber adapters, AT&T 3B2 minicomputers, and AT&T's Information Systems Network.

A Network Access Unit Plus (\$895) lets you connect a 386-

based AT&T 6386 WGS to the network to monitor all network transmissions.

If you need longer distances between nodes, the \$500 network Fiber Adapter extends the limit to 9,800 feet with fiber-optics. An adapter is required at both ends of each fiber-optic

link.

AT&T is also offering the
1:10 Bridge, a \$4.500 desktop
unit that hooks up two networks
and decides what data should
pass from a StarLAN 10 network to a 1-Mbps StarLAN.
The 10:10 Bridge, \$7,000, does
the same for connections between StarLAN 10s and other

IO-Mbps LANs.
The \$2,895 Fiber Hub gives you six fiber ports that connect to PCs with Fiber Adapters or to other Fiber Hubs at distances of

un to 3.280 feet AT&T has also produced operating system software that doubles throughput of its former software. Versions of server software exist for 8 users (\$625), 32 users (\$1,675), or for 386-based servers (\$2,295). List Price: Starl.AN 10, Network Hub Unit, \$1,895; PC Network Access Unit, \$495; Micro Channel 100 NAU, \$495; NAU Plus, \$895; Attachment Unit Interface for Ethernet coax, \$200; Fiber Adapter, \$500; Fiber Hub, \$2,895; 1:10 Bridge, \$4,500; 10:10 Bridge. \$7,000: DOS Server Program for 8 users, \$625, for 32 users, \$1,675; 386 Server Program, \$2,295 AT&T Data Systems Group, One Speedwell Ave., Morristown, NJ 07960; (800) 247-1212.

CIRCLE 434 ON READER SERVICE CARD

of invoices and multipart forms.

Print speed is 264 characters
per second in draft mode and 54
cps in near letter quality. Printing is bidirectional for text, unidirectional for graphics.

The SelecType control panel selects elite and Roman and sans serif fonts. The printers offer a parallel

Sans serif fonts.

The printers offer a parallel port, an 8K buffer, and a 55-decibel noise level.

Options include a cut-sheet feeder for automatic feed of singie sheets or envelopes, a pull tractor, and serial interface boards. List Price: Egson FX-850, \$549:

List Price: Epson FX-850, 3549; FX-1050, \$799. Epson America Inc., 23530 Hawthorne Blvd., Torrance, CA 90505; (800) 922-8911.

CIRCLE 438 ON READER SERVICE CARD

NEC Enters CD-ROM Market with Players, Two Graphics Discs

NEC Home Electronles is making its way into the CD-ROM market with two drives—the external Intersect CDR-77 and the internal CDR-80—and two graphics-oriented software disks. The products are slated for shipment by summer's end.

While the CDR-77 will list at \$999 and the CDR-80 at \$899, both will require one of four \$199 interface kits, depending on what type of computer the drives will attach to. With the appropriate kit, the CDR-77 will run with XTs, ATs, PS/2s, NEC MultiSpeed laptops, and Apple Macintokes. The CDR-80 will install in XTs, ATs are SP/2s.

Each interface kit contains drivers, Microsoft's CD-ROM extensions (which allow DOS to treat the readers as drives), and an SCSI adapter for the appropriate machine.

Both readers accept IBM High Sierra, Macintosh HFS, and ISO 9660 disk formats. NEC is offering two software disks with 3-D graphics clip art, fonts, and video im-

ages. List Prices Intersect CDR-77 (external), 5999; CDR-80 (internal), 5999; CDR-80 (internal), 5999; prophic image and font disc, 5399; whee image disc, 5399; interface kit, 5199. Requires: Interest CDR-77: XT, AT, NEC MultiSpeed, or Apple Macintosh. CDR-80: XT, AT, or PS2. Interface kit, NEC Home Electronics, 1259 Michael Dr. Wood Dale, IL 60191; (312) 860-9500.





Con	4 10	ucla		catar.	1 80	328-4473 US 1 818 70 1 800 231-6603 CA	5-1895
Low	4 <i>D</i>	WC U		MCA			79-00
	'			PRINT SOLUTIONS		RAM 2003 EMS Expansion RETH REHERATION Logical Connection 256% MAYES Smartmodern 1200	119 00
SOFTWARE	4	Generic Cad On Plat	54 00 29 00 29 00 29 00 165 00	Disk Technique Disk Technique Plus	\$5.00 \$5.00	Logical Connection 256K	399.00
	579.00		29 00	ONAID SOFTWARE	CALL	Smartmodem 1200	325.00 325.00
Design Cad	165.00	Auto Dimension 30 Solid Modeling/Rendering	165.00	Copywite / Zerodisk QNARTERDECK			375.00 489.00 489.00
Design Cad 3D AMPTON TATE Multipute II	165.00	RAYES Smartpen III	165.00	Designew 2 01	75.00	Smartmodem 2400 Smartmodem 24008 W/Software HER COLLES	
Obase III Plus	269 00 409 00 199 00 429 00	Displayence IV DOS 3 3	299.00 95.00	Rightwinter	59 00	Hercules Manachrome Plus	199 00
Rapidile Framework II	199.00	LATRICE	95 00	Project School or Network	275.00	Laseriet II Fonts for Laseriet II	1849.00 CALL
	226.00	Lattice C Compiler	245 00	New World Writer Types Tutor IV	75.00 27.00		299.00
Master Graphics ARE SAM SYSTEM	301.00	Ward Processor W/SperL/Mer go Ward Processor V1 5	95.00			Above Board PC 64K Above Board 286 W / 512K 0087-3 (5M HZ)	299.00 389.00 116.00
ASK Sam AUTODESK	255.00			SOFTLOSIC SOLUTIONS	39.00		
Autoskerch Enhanced	65.00	Total Word	265 00	Disk Oprimizer	42 00 42 00 42 00 119 00	00287 (6 MHZ) 50827 (8 MHZ)	199.00 299.00 349.00
Org Plus	85.00	CONTRACTOR DEVELOPMENT	169 00	Double 00'S	42.00	80827 (8MHZ) 80287 (10 MHZ) INTERNATIONAL BATTERY AT Seniorment Survey	349.00
Forming W/Greatest Hits SORING COMPLYTED SERVICES Soring Graphics (30 Color) SORIAND	95.00	Symptony V 2 Manuscript	CALL	g Liberty Mage Mercy SOFTWARS MASTER	60.00	AT Replacement Battery AST Sax Pack Battery	27 50
Boeing Graphics (30 Color)	219.50	Lpt vs 1-2-3	CALL	FISH 5 6 SOFTWARE PUBLISHING	49.00	INVIN MACHITICS	
Turbo Suzabase Toolbox Turbo Suzabase	95.00	Hall Freetance Plus	CALL CALL CALL CALL CALL CALL	PES First Publisher	85.00	120 XT 20MB Internal 125 AT 20 MB Internal	349.00
The Developer's Library	65.00 235.00	Graphwriter II Metro	CALL		119.00		69.00
Turbe Lightning Retiex	65.00	Graphwriter II Metro MATHSOFT Mathcad 2 0	229.00	PFS Professional File PFS Professional Plan	65 00	Masterpece Masterpece Plas Masterpiece Remote	109 00
Superkey Turbo Proton	65.00 90.00 65.00 65.00 95.00	MAXIMINE	41.00	PFS First Choice Harvard Tistal Project II	119.00 140.00 65.00 55.00 389.00 319.00		
Turbo Baset	65.00	Maraham Technology		Harvard Graphics SYMANTEC	219.00	Legimouse C7 Legimouse Hi Rez Legimouse C7 + Paintbrush Legimouse W/Cad/Paint	79 00 99 00
Turba C Sidekick	95.00 59.00 129.00	Managing Your Money 4 0 MERIPHAN TECHNOLOGY	125 00	TRAVELLING SOFTWARS		Logimouse C7 + Paintbrush Logimouse W/Cad/Paint	95.00 139.00
Siderick Plus Eureka	129.00	Carbon Copy Plus MICROGRAFIX	119.00	Lagrick Pus TURKER HALL	90 00	Publisher Mouse	129.00
Quatro Paradox V 2 0	99 00 149 00	Designer MICROLOGIC	479 00	Note-1-Pus SQZ Plus	55 00 65 00	BUS Mouse W./Paintly ush BUS Mouse W./Windows	115.00 155.00
	429 00 65 00 45 00		79 00		95 00	Senai Mouse W./Windows Senai Mouse W./Windows	
Turbo futor 4 0		Wordstar Professional 5 0	256.00	Pretraster Pus	32 00		155 00
RESAUTHEONEN	35.00	Wordstar 2000 Plus MICRORIA	245.00	Art Gattery I & If & Iff (Each) Newsphiliar II	22 00 55 00	Fact 85	79.00
Timeline V 3 Timeline Graphics	356 00 119 00	Phase for Dos MICROSOPT	509 00	WALLSOFT The Documentor	189.00	Pocket Modern	115.00
Print Shoo		Pagovew Quick C	36.00	eflow WINDWARD	66.00	PC Mouse BUS Plus PC Mouse Senal Plus	93 00 95 00
Memory Mate	39 00 45 00	Gueck C Word Queckbasic	221.00	Printe Time	55.00		
	45.00	Quickbasic C Comprier Fortran Comprier	86 00 309 00	Printe Time WORD PERFECT CORPORATIO Ward Perfect 5 0 Ward Perfect Network Server	249 00	Multisync II Multisync Plus	629.00 1015.00
CINTRAL POINT	29 00 115 00	Fortran Compiler Cohol Compiler	309 00		346 00 75 00 195 00 299 00	HEC INFORMATION SYSTEMS	
Copy II PC Copy II PC Option Brd Dix PC Tools Deluya	115.00 45.00	Cobol Compiler Macro Assembler	105 00 39 00	Plan Perfect Data Perfect	195.00	P 660 P 2200 00 COL	499 00 389 00
COMPUTER ASSOCIATES	299.00	Learning DOS Flight Simulator	39 00			OKIDATA	
Supercald IV Superproject Expert ACDPAC BPI	459.00	Excel Windows 386	145 00 145 00	Word Perfect Library WORD TECH	85.00	OKIBATA Microline 182 Plus Microline 192 Plus	269.00 375.00
ACCPAC BPI	295.00	PC Works AICROSTUP		Otick Diamend Quicks over lamond	115 00 345 00	Microstone 292 W/Limertace	509 00 509 00 665 00
CONCENTRIC BATA SYSTEMS	115.00	Crosstark XVI Crosstark Mark 4	99.00 129.00	Ventura Publisher 1 1	510.00	Microline 293 W/Interface	1529 00
CONSUMER SOFTWARE	55.00		145.00	HADDWADE	310.00	PARADISS	189.00
COM INTERMATIONAL		Abity Pan HANTUCKET		HARDWARE		Autoswern 480 Modular Graphics Card	129 00 259 00
Corefast DAC	99.00	Cigger HAZHOBA	399 00	A ST DOSEA DOW	189.00	PLUS REVELOPMENT	
Easy Accounting 2 0 Easy Payrol 2 0	59 00 40 00	NEW ENGLAND SOFTWARE	165 00	Premium 286 Model 140 Computer	3046-00 1999-00 335-00	Hardcard 20 MB Hardcard 40 MB	599 00 749 00
Berus Fack DELTA TECHNOLOGY	109 00	Craph in Intellige HORTH EDGE SOFTWARE	55 00	Advantage Premium 512K Six Pack Plus 384K Six Pack Premium 256K Rampage AT 512K AST 5251 (1) Enhanced	335.00	POLAROID	1499 00
	55 00		119 00	Six Pack Premium 256K	289.00 219.00		2395 00
GARTAL MAINITING	59.00	PAPERBACE SOFTWARE	69 00	AST 5251/11 Enhanced	439 00 579 00	PRACTICAL PERIPHERALS	99 00 119 00
DIGITAL RESEARCH	32 00	VP Planner VP Planner Plus	59 00 69 00	Hat Shot 286	395 00	Practical Modern 1200 SA Practical Modern 2400 INT	119 00 165 00 199 00
Gern Draw Plus Gern Iss Word Ples	179 00 125-60 119 00	PATTON & PATTON	155 00	Merographics Short Card Memory Expansion 384K Modular I/O Bare P/S/Clock Clock Board Standalone	79.00 175.00	Practical Modern 2400 SA SAMEURA	
	119 00	PAUL MACS	59.00	Modular I/O Bare P/S/Clack	75.00 35.00 65.00	Anne Monter SLASATE TICHHOLOGY	15 00
Presentation Team Deskrop Publisher	295 00 165 00	Mace Unions PC SUPPORT GROUP			55.00	ST 251 40MB No Cerensier	439.00
Smaltak V Smaltak V Smaltak V 286	79 00	Lightning Light 30 V 2 0	59 00 69 00	CHEEN	159.00	ST 251 40MB No Contribute ST 225 20MB W/Contribute ST 238 30MB W/Contribute	299 00 349 00
Smaltalk V 286	149 00	PEACHTREE	155.00	MSP 40 MSP 155	349 00	ST 4038 30MB For AT	159 00
X Tree X Tree Pro	29 00 65 00	PERSOFT Smartern 240	206 00	MSP 50 COMPUTER ACCESSORIES	449.00	Sommasketch 1201 Plus	416.00
PITTH GENERATION	62 00	Referee PETED HORTON COMPUTING	45 00	P11 Power Director	99 00	Summasketch 1201 Plus TOWCHEASE Wardport 2000 Modem Worldoort 1200 Modem	279 00 159 00
Fastback Plus	105 00	Norton Utilities Norton Utilities Advanced	55 00	P15 Power Director DIGITAL COMMUNICATIONS 18M4 3278	759 00		
Fastback Plus Fastback Plus FOR SOFTWARE Forbase Mas	215 00 299 00 276 00		76 00 39 00		675 00	1 1000 Laptop 1 3100 20 Laptop	1059 00
Fortage Multi user Finance Parterie Unimited FUHR SOFTWARE	299 00 276 00	POLYTRON Polymotows Desk Plus	49.00	EV 1900 8MHZ AT System EV 1900 10MHZ AT System Evercon II 1200 Modern Evercon III 2400 Int Modern	1149 00	P371 Printr P341 E Si	545 00 759 00
PUNK SOFTWARE	40.00		45.00	Evercom 11 2400 km Modern	129 00 225 00	P341 E St. P351 Model ?	759 00 1109 00
ADVANTAGES • Orders placed before 3 p. m. (PS same Gay • We welcome corporate accounts • Firet lectrical support • Immediate registerment of defect • Bulk obsorbts		Immediate shipment on parthiase ison qualified inshibitions (school universities included) No hidden charges TERMS a If price subject to change without We do not gearantee compatibility in change in VISA or MasterCard 2 No.	s and	American Express: No naturns with Short ahipments must be notified in hours: 15% restocking fee on non- goods: \$3.10 C 0.0 charge. Shop per dem. less on bulk ordens: (\$6.5 bel) (Higher for some nativalare its Call for prisons lier any flem not line.	othin 45 defective sing \$4 50 () Blue La- ims)	8a m to 6 per missi appet to 8a m to 6 per Monday-Friday 10a m to 2 pm Satarday PST P.O. BOX 1388 8504 Centry Sti Sure #109-110 Resedo, CA 91335 Wa welcome international Or Corporate Accounts.	
One milion dollar inventory				this price list	_	Telex 199415COMPU UR/Fax 81	a-705-4865
1 818 705-1895	US	1 800 231-60	03 (A 1800 328	447	3 US	

WordPerfect 5.0

(continued from page 48) screens of earlier versions. In a nice touch, however, users of the Hercules Graphics Card Plus can now see italies, superscripts, strikeouts, and other attributes on-screen, and EGA/VGA users get a choice of screen fonts that display italics

or underlines. Line and position measurements display in inches, but you can change measurements to centimeters or noints-or for the most precise control, Word-Perfect's undocumented internal "w" units of 1/1.300 inch. At last. Version 5.0 is using absolute measurements rather than character counts for margin and tab settings. But you can still make the status line display line

and character numbers The basic Version 5.0 keyboard is mostly unchanged from that of Version 4.2. All submenus now use mnemonic abbreviations instead of numbers. What you gain in mnemonics you lose in excess keystrokes, however. Version 5.0 lowers many of its functions three or four menu levels deep.

Documents from Version



The soft font selection screen displace the curtridges or fonts your printer supports. You can mark fonts or cartridges for automatic descaloading

4.2 import automatically into Version 5.0, but you'll find an occasional problem as the result of the differences in font handling and other features. Version 4.2 macros can't be converted completely; you're probably better off creating most macros anew.

Version 5.0 takes slightly longer to load than Version 4.2. and slightly longer to jump through complex files, but the increase wasn't a problem.

WordPerfect 5.0 clearly

takes the honors as the most technically advanced word processor you can buy. But not all its features were fully implemented in the first copies shipped, and it still has some inconveniences and bues.

Although kerning is an option on the program's print menu. WordPerfect Corp. hadn't begun writing the necessary kerning tables at press time. The initial LaserJet driver had errors that kept characters like the copyright symbol from printing at all. WordPerfect Corp. promises to fix these problems soon.

Other problems have to do with the program's design. Version 5.0 still links indents and hanging indents to tab settings, instead of using the absolute measurements used by other programs and by WordPerfect itself in every other aspect of formatting. When you edit hanging-indent text, the cursor jumps back and forth, and you're likely to lose formatting.

Version 5.0 makes you write an unintuitive macro if you want to change all your underlined text into italies. Word, XyWrite, and Nota Bene let you do a simple search-and-replace.

If your word processing needs are relatively simple, however, you may want to delay uperading from Version 4.2 until WordPerfect Corp. solves the remaining problems

The flaws of WordPerfect 5.0 are trivial compared with its innovations and power, however. Already the market leader. WordPerfect now becomes the decisive technical leader as well. Everything else on the market suddenly has a clear target to aim for.

Do-It-Yourself Electronic Mail, No LAN Required



HANDS ON

BY FRANK J. DERFLER, JR. PC-tPost, from Coker Electronics, is a low-cost do-it-yourself alternative to subscription e-mail services like MCl Mail. PC-tPost can turn any IBM

PC, XT, AT, PS/2, or compatible into a centralized electronicmail system able to receive, store, and forward electronicmail messages over the telephone lines.

If you need to store only 50 to 200 messages, you can use a PC with dual floppy disk drives as the electronic-mail server. A machine with a 10MB hard disk can store up to 3,200 short messages. The messages exchanged in the PC-tPost system can be

ASCII notes, binary files, or a combination of both

Coker Electronics sells software for both the electronicmail server and the calling stations, but the calling stations can use any software with Xmodem-CRC file transfer capabili-

Individual users of the PCtPost system call into the Central system to pick up or drop off messages. The remote calling software includes a text editor that you can use to create messages. You can also address messages from prestored distribution lists. The software automatically calls the Central machine, collects and transmits messages, and lets you read your mail off-line to reduce telephone charges.

PC-tPost Central (perhaps one at each branch office), each central machine can call each other to pass messages to each others' recinients. You can regulate the timing of these Central-to-Central calls to use after-hours phone rates.

Maintaining the message base in most bulletin boards or e-mail systems can be a timeconsuming task, but PC-tPost makes this job particularly easy. A separate utility allows the administrator to delete messages according to age and/or delivery

Status The service is simple to use and works well. However, PCtPost Central can tend only one telephone line at a time. Some organizations will find one-at-atime service too limiting.

If you need electronic-mail services to link your organization, PC-tPost is an inexpensive and effective alternative to commercial services



PC-tPost, Version 3.0 Coker Electronics 1430 Lexington Ave. San Mateo, CA 94402 (415) 573,5515

List Price: PC-tPost, \$129 (\$99 in quantities of two or more): PC-tPost Central, \$229. Requires: PC-tPost: 256K RAM, DOS 2.0 or later. PC tPost Central: 512K RAM, DOS 2.0 or later. Hard disk drive recommended for larger

mailboxes. In Short: An inexpensive way to establish a wide-area electronic-mail service. It is limited in being able to handle only one call at a time, but the system is effective and easy to use and

maintain ORCLE 433 ON READER SERVICE CARD

Get Sprint and you'll never be afraid of the dark!



Nothi	ing hol	ds a candle	to Spri	nt!	
Features ● = Yes O = No	Sprint 1.0	WordPerfect 4.2	MS Word 4.0	WordStar 4.0	MultiMate Adv. 1.0
Maximum file size	Disk	Disk	Disk	4MB	128K
Thesaurus (integrated)	•	•	•	•	•
Windows Open (maximum)	8	2	8	1	1
Files Open (maximum)	24	2	8	1	1
Cross-Reference (dynamic)	•	0	0	0	0
Indexing Options	7	1	3	3	0
Columns: Parailel	•	•	•	•	•
Snaking (chg. * same page)	•	•	Not same pg.	0	•
H-P LaserJet Support	Full	Partial	Fuil	Partial	Full
PostScript Support	Pull	Text	Full	0	Text
Mouse Support (integrated)	•	0	•	0	0
Dynamic Shortcuts	•	0	0	0	0
Alternative User Interfaces	•	0	0	0	0
Verify Spelling as you type	•	0	0	0	0
Programmable Macro lang.	•	0	0	0	0
Save File ¹	5.9	41.1	9.7	4.4	1.0
Top to Bottom ²	7.5	7.5	49.4	8.1	21.0
Search and Replace ³	1.6	6.8	4.6	17.1	13.4
Find Unique Word	3.3	6.2	7.0	13.8	20.6
Consensed Lint Police	****	6405.00	0450.00	£405.00	8505.00

This total very professed on an Arez 264 (8 MRs), 640K RAM. "File size 100K." \$106 (lines." 14 constraints. Time shows are in records. (Benchmark details evaluate upon request.)

patents, and we will arrange a reland. I Acrised products are trademarks or registered trademarks of Borland International, loc. Other broad and product names are trademarks of their respective

lor. Other broad and product names are trademarks of their respective for 1227 CIRCLE 137 ON READER SERVICE CARD Forgetting to "Save" is a fact of life as are power outages, and it used to be that a power outage could wipe out everything you've done. Not any more. Your work is always safe when you Sprint.*

Sprint's "Auto-Save" automatically saves your words as you type, so if the lights do go out, you may be in deep darkness but not deep trouble.

Sprint's Auto-Save is more than "insurance," it's also invisible. You know it's there, but it does its job without interrupting yours.

Sprint: It's the word processor with everything!

You name it, Sprint's got it. Incredible speed, Auto-Save, a customizable user interface, and professional output. Sprint even includes a bonus pack of alternative user interfaces that make it act like WordStar,* MultiMate,* WordFertex,* Microsoft* Word, or other familiar word processors—a \$99 yalue free!

Sprint has all this and does all this for only \$199.50 instead of the up to \$600 that some companies demand. Sprint automatically saves your words; it also automatically saves your money. Sprint—The fast track to performance word processing.

60-Day Money-back Guarantee* For the dealer nearest you Call (800) 543-7543



PageMaker Goes Professional



HANDS ON

BY GERARD KUNKEL PageMaker, Version 3.0, the latest release of Aldus Corp.'s ever-popular desktop publishing system, goes a long way toward bridging the gap between ease of use and professional features in desktop publishing packages. Aldus leapfrogged Version 2.0 to synchronize PC and Macintosh PageMaker ver-

sion numbers Version 3.0 adds powerful features such as automatic text wrap, snaking text columns. and style templates while maintaining the ease of use that has made PageMaker the DTP package of choice in many of-

Version 3.0's innovative approach to text wrap gives you several ways to design text around irregular objects. An invisible frame surrounding a graphic object consists of distinct points. Each point can be moved either toward or away from the graphic to customize the text wrap. You can also insert new points and surprint over graphics.

Whereas the previous version of PageMaker required you to place blocks of text individually, Version 3.0 automatically snakes text into the next column or page and inserts pages when required. This greatly speeds the placing of long docu-

Version 3.0's style sheets let you store your custom styles as templates. Templates include the master publication design as well as type point sizes and styles. Each publication carries its own template, but a template can be copied from one publication to another or stored separately as a template file.

ents into master designs.

The enhancements also include import and export filters that allow popular file formats to be used for getting data and text in and out, without intermediate conversions. The package includes filters for Lotus 1-2-3 .WKS and .WK1 files, dBASE DBF files, .CGM metafiles,

HPGL, Videoshow files, and | others. Export support is limited to standard ASCII and Microsoft Ward formats.

The addition of layers for spot color resolves the tedious registration problems that Page-Maker 1.0 presented when trying to create complete electronic publications ready for printing. Objects or text may be copied or moved between layers to allow for on-screen two-color

production PageMaker 3.0 runs notably slower than Version 1.0, due in part to the increased overhead in Micrasaft Windaws, Version 2.0, and to PageMaker's own added features. The wealth of new features in this version justifies the performance drop, but

that drop is substantial. Version 3.0 running on my 20-MHz 386 machine seemed about the speed of Version 1.0 running on an 8-MHz AT. With the introduction of

PageMaker 3.0, the PC version has finally caught up with the Mac version. Page composition features are the same across the



PageMaker, Version 3.0 Aldus Corn 411 First Ave. South, #200 Seattle, WA 98104 (206) 628-2375 List Price: \$795; upgrade, \$95;

\$47.50 for Extended Technical Support Subscribers Requires: Microsoft Windows, Version 2.0 (comes as Windows 2.0 runtime program). In Short: Sets a new standard for desktop publishing packages by combining ease of use and

professional publishing features. Not copy protected. ORCLE 445 ON READER SERVICE CAR

two platforms and files are transportable between the PC and Mac via an AppleTalk PC card or a Dayna Card file transfer system

While professional publishing systems still have a strong command of their market, the release of PageMaker 3.0 raises the benchmark in the easy-touse, full-featured DTP software category. Future releases of PageMaker and other DTP software products may well eliminate the need for two publishing



A fast way to change fonts in PageMaker, Version 3.0, is to highlight the text to be of fected and pick a style from the style menu, at the right of the screen

Keeping Tabs on NiCds



BY NEIL J. RUBENKING

Nickel cadmium batteries have two major failings: when they run out of juice they do it suddenly, and if you don't discharge them fully before recharging, you can reduce their ability to hold a charge.

Battery Watch, a \$39.95 software package by Travelling Software, addresses both of these problems.

The package installs in 10K to 20K RAM as a TSR. After loading the program, you press the hotkey at any time to view the Estimated Time to Empty, based on current power draw.

During disk access, the estimate will be lower; if backlighting is off it will be higher. A status screen lists the power consumption for each component of your

Battery Watch can also restore your battery's life to its rightful level. If you regularly recharge a 4-hour battery after an hour of use, eventually it will just go empty in an hour. Battery Watch's Deep Discharge feature breaks this cycle and returns your battery to its original capacity by turning components on and off to drain the battery completely. Before Battery

Watch, the only alternative was

to spend over \$100 on a new

FACT Battery Watch

Travelling Software Inc 19310 N. Creek Pkwy. Bothell, WA 98011 (206) 493,9099 List Price: \$39.95 Requires: Supported laptop computer, including Datavue Spark: Epson Equity LT; NEC MultiSpeed; Sharp 4501, 4502. and 4521; Tandy 1400; Toshiba T1000, T1100, and T1200; and Zenith 181 and 183: 10K to 20K RAM: DOS 2.0 or later. In Short: An inexpensive.

valuable laptop tool. Not copy CIRCLE 446 ON READER SERVICE CARD

"Most people we meet who give Paradox a try, end up switching to it"

Mark Cook and Steve King, Data Based Advisor



Here's what Data Based Advisor had to say about Paradox:*

"You'll find creating a Paradox database easy ... The real test of a DBMS isn't how easy it is to enter your data, but how easy it is to query that data, rearrange it, and perform calculations with it

The Paradox Ouery by Example (OBE) system allows you to easily structure queries from two or more databases ...

Even novices create applications without programming

"Any Paradox user, even a novice one, can easily use the Personal Programmer to generate menu-driven Paradox applications . . . The Personal Programmer works well all the time. even with long, complex applications. We found it can really simplify application development."

ter spallation is our main concern; if within 60 days of purchase this date tot perform in accordance with our claims, call our customer ser serbern, and we will according a refund

"Finally, as the frosting on the applications developer's Paradox cake, it'll only cost you \$9.95 to buy the run-time version of Paradox 12 01 to distribute [unlimited] copies of your application."

Macros save programming time

"What's really nice about Paradox macros is this: the program records them in the Paradox Application Language (PAL), Once you've recorded a macro, you can name it, save it, and re-use it. But best of ail, when you start programming with PAL, you can include your macros as part of your PAL code, really saving programming time."



Paradox gives you true concurrency on your network

"You'll find using Paradox on a network is exactly like using the standalone version. The real power of the Paradox NetPack shows itself when you simultaneously access a database being used by other people ... The program elegantly handles all the chores of a multiuser database system with little or no effort by network users. Along with allowing you to almost instantly see changes made by other users, Paradox has very powerful automatic record locking features."

Report Generator is a joy to use

"If you've ever suffered with creating dBASE III PLUS reports, you'll find the Paradox Report Generator a real joy to use . . . The Report Generator allows you to create headers and footers and to place fields wherever necessary to get the appearance you want."

Paradox is the one we choose!

"One of us is a confirmed Paradox user who has used the software since the beta-version of Paradox 1.0. The other just learned to use Paradox for this evaluation; he's decided to give up dBASE and switch. Excerpts from Mark Cook and Steve King's

review of Paradox in Data Based Advisor, Paradox is just the beginning

January 1988.

Borland has Paradox 2,0 for standalone

or network users under DOS and special versions optimized for your 386 and OS/2 environments. Plus a whole family of professional software solutions that work together and build on each other, including Quattro:* The Professional Spreadsheet: SideKick* Plus: The Professional Desktop Manager: and more. See them today!

60-Day Money-back Guarantee* Reprinted with permission from Data Saxed Advisor, Vol. 6. No. 1. Copyright 1967. Data Based Solutions, Inc.



LIBRARY SUPPORT.

ANOTHER CAREER OPPORTUNITY FOR PCs WITHOUT OUR 386 MOTHERBOARD.

With Our MotherBoard, Sour PC, XT or AT Can Run New OG/2 Releases III you' a rubn't levey pour computer on your desk than under fox, get our 386 MotherBoard. Our Board will give your speecheet, complex COU and graphies, and multitasking applications a hose to boast about In fact, our line of MotherBoard societates a hose to boast about In fact, our line of MotherBoard societates your PC, PC/XT or PC/XT to speech sequent to the EMP SE3 Model 80. And faster Because we're built in 1 Megalyst of high speed RMM and a 387 math Opporcases societ.

Accelerator Cards Have No Future. An accelerator card can only turn an obsolete computer into a faster obsolete computer. Our MotherBoards advance; your computer into a new 396 system! They run (S/2, Windows) 366, URXI V and PC-MOS/396. For more power, you! If into the object of the capacision softs that accommodate the latest 1/0 expansion cards. Only our 386 MotherBoards give your PCs an untilinited future!

The Critics Applaud! PC Magazine awarded our Board "The Editor's Choice" for 386 Replacement Boards. PC World called it "the Upgrade Product of the Year." Technical Features = 16 MHz 80386 = 1 Megabyte of 100 nsec 4-way interleaved RAM = PC/AT compatible 1/0 and BIOS for support of OS/2 = Six 8-bit expansion slots = two 16-bit expansion slots; four on 386 MotherBoard/AT = 0ne 32-bit expansion slot for up to 12 Megabuse of high sweet memory. Batture-powered clock calendar

386 MotherBoard for the PC or PC/XT	\$1695
386 MotherBoard for the PC/AT	\$1795
386 MotherBoard/20 MHz for PC/AT	\$2195
32-bit RAM Board (1 Mbyte installed; up to 4 Mbytes)	\$695
16 MHz 80387 math coprocessor	\$695
16-bit combination hard disk/floppy disk controller	\$245

Step up your PGs with our easy-to-install 386 MotherBoards. For more information, call: 1 (800) 443-6284. In New York: (516) 434-1600. All our products are available at your local computer dealer!

Hauppauge Computer Works, Inc. 175 Commerce Drive, Hauppauge, New York 11788

Hauppauge

OfficeWriter Light Expands Word Processing Functions

OfficeWriter Light, from Office Solutions, now offers a 50,000-word dictionary, laser printer support, and ASCII conversion capabilities. Additional new features include fivefunction math, outlining, and document sort. For the laptop user, OfficeWriter Light pro-



OfficeWriter Light has increased menu vides interactive pagination, document summaries, and on-screen columns. The two-disk package retails for \$195. Office Solutions Inc., Madison, Wis.: (608) 274-5047.

NCR Offers Rebate

NCR Corp., will buy back processor boards from users of its 8028-6 board PCIS low when they purchase an 80386 board upgrade kit. Users have a choice of receiving either a eash trebate or a Microsoft Windows package and an NCR mouse. The cash value of the boards varies with the purchase date. One-year-old boards are worth \$252, 2-year-old boards are \$150, and 3-year-old boards are \$57.80.

Dosigner Uses WYSIWYG Text Editina

Micrografs has added several new features to the Designer graphics package. Designer. Verton Designer graphics package. Designer is seriem WYSIWFG text editing, and support for color PostScript printers. The enhanced color interface allows users to access up to 16 million colors. Version 1.2 is 599 for registered users and free to suprous who purchased Designer after May 1. The retail price for the formation of the price of the price of the Text. (800) 272-378 graft for. Richardton, Text. (800) 272-378 graft for. Richardton,

Microsoft Supplies Free

Microsoft Word, Version 4.0, users now qualify for a free Bistream Fenturen Installation Kit and a copy of Microsoft Pageriew. These two products represent a combined value of \$333 and are designed to provide a graphical user interface. To receive the updates, users should send the two coupons enclosed in the Word package to Microsoft. Microsoft Corp., Redmond, Wash. (206) 882–8080.

iBM Advances SolutionPac

IBM has updated the three software compo nents of its personal publishing Solution Pac. SolutionPac is designed to provide all the hardware and software that is necessary to produce high-quality in-house documents. SolutionPac software now includes Aldus PageMaker, Version 3.0, Microsoft Windows, Version 2.03. and the IBM Personal PagePrinter Adapter Licensed Program, Version 1.3, Upgrades from Aldus are \$15 for users who purchased Page-Maker after November 2, 1987, and \$110 for those who purchased prior to that date (Aldus Corp., Scattle, Wash.; (206) 622-5500). Microsoft Windows upgrades are free to registered users who purchased Windows 1.0 after April 1, 1987, and cost \$25 to those who nurchased before that date (Microsoft Corp., Redmond, Wash.; (206) 882-8080). PagePrinter Adapter Licensed Program upgrades are \$70 (IBM Corp., White Plains, N.Y.: (914) 765-1900

Toshiba Adds Backlit Screen

Toxibia has added a backit liquid crystal display to its line of T1200 portable computers. This LCD option provides better screen readability in dim lighting and is available with both the T1200H and the T1200F. The backlit screen option is an additional \$200 with either portable. Toxibiba America Inc., Irvine, Calif.; (714) \$83-300.

PC Image 1.2 Manipulates Gray-Scaled Images

Datacopy's PC Image, Version 1.2, runs under Microsoft Windows and works with all Datacopy scanners. This image processing package allows users to capture, utilize, and save gray-scaled images. A free copy of



PC Image 1.2 reproduces gray-scaled

Microsoff Windows will be included in all packages shipped in the first 90 days. Updates are free to users who purchased Version 1.1 after February 1 and \$50 for those who purchased prior to that date. Suggested retail price for the package is \$495. Datacopy Corp., Mountain View. Calif. : (415) 965-730.



Here's a radical idea: give people who work together the means to easily starter information among PCs—but don't force them to become computer experts to do it.

Here's another one. Make this network so simple to install that you can set up the whole thing in oh, soy, o holf hour or so.

Presenting TOPS:

MORE NETWORK. LESS NET WORK.



With the TOPS Network, you and your co-workers an access files fram each other's computers exactly as if they were sitting on your own PC or hard disk. And even print out those files (with our TOPS NetPrint" software) directly to any printer that supports the "bastScript" language, such as Apple's LaserWriter." All through easy-to-us menu commands.

The result is the very comforting—and productive—feeling of being able to concentrate on the work at hand, instead of on having to learn the network.

On a TOPS Network, every computer can share files directly with any other, thereby sharing the load of the entire network. The result is that you don't have to purchase an expensive central file server. Or shut down the network when you want to add a new computer. Or hire an extra person to manage the whole affair.

And setting up TOPS is just as straightforward. You can install the necessary network card—such as our TOPS FlashCard*—in no more than twenty minutes. Loading the TOPS software? We've unofficially clocked it under five minutes.

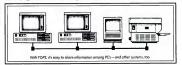
As if all that weren't enough, TOPS runs over common twisted-pair abiling, such as regular phone wire. Just add an easy-to-install network connector—such as the TOPS TeleConnector—at each node. And at only, \$189 for the software, and \$239 for each TOPS FlashCard, TOPS is the least expensive way to get your workproup working toaether.

Of course with TOPS, PC-to-PC communication is just the beginning. Because without scarficing simplicity, we also offer products that let you share information just as easily with other networks and systems, including Macintoshes" and Sun" workstations.

Want more information? Give us a call at 800-445-TOPS (from outside the Use and Canada, call 415-769-8700). Or write to us at TOPS, 950 Marina Village Parkway, Alameda, California 94501.

After that, it gets easier.

25 See and the familipay are implement malements of fam Microsystems in it. TOPS Transcript and TOPS Transcripted descripts of Adulte Systems (in income Microsystems and Institute or independent and Institute or Institut



COMMUNIOUÉS

edited by Bill Howard

Sex Change

"A theft has been committed. The thief is dashing from country to country and city to city. Your student detectives know only the name of the thief. Carmen Sandiego, and they have the task of arresting him. -Description of Where in

the World Is Carmen Sandiego? from Scholostic's 1987-88 in-Heavier Than Air?

structional materials catalog

"'Wanted: Crimebusters. Candidates should have an inquisitive mind ' Students answering this ad are given one assignment: Stop the dastardly criminal Carmen Sandiego and

her slippery gang!" -Some page, description of Where in the USA Is Carmen

Sandiego? Would That It Were So

"Scores of men had failed to "You can save time, worry and conquer Mount Everest. Then on May 29, 1953, a British experhaps even money by using pedition finally reached the back-up systems to protect your summit. Not only did the men equipment in case of a power inmake the difference. The techterruption. Many computer nology did. Lightweight portasoftware packages have a builtble oxygen developed for aviain system to keep your files tion made the 29,018-foot climb from being lost, Back-up batterpossible. Technology enhances ies are often available on digital equipment." performance."

-Annlied Data Research -Pomphlet sent with Caralina Pawer & Light bills

Classified Intelligence

The Columbia computer, 100% IBM compatible. Panasonic printer, monogram monitor, 23 programs. \$2000 or best offer . . . XXX-XXXX

-Salt Lake City Trihune February 14 1988 Geneve 9640 by Myarc.

Inc., a complete upgrade system for the T199/4A . . . built in sound chip with three tones and one noise . UCSD Pascal version 4.22 run time, allows the loading and running of thousands of standard Pascal programs. such as Fortran 77 and Co-

bol. -Computer Shopper, February 1988

XT computer-640 memory, I floppy drive, I 20 min, hard drive, \$875, xxx-****

-Nashville Tennessear February 17, 1988

AST 1BM computer: Tape dry, 40 meg, 2 meg memy, 2400 Baud modem \$3750.

xxx-xxxx -Huntington Beach (Calif.) SuperSaver, Febru-

ary 10, 1988 \$3.00 a disk, \$1.00 for a catalog or \$3.00 for a catalog and a demo disk. Special

business pak: 6 disks for \$20.00 -PC Resource, Febru-

ary 1988

Formerly, the Dealer Serviced Jaquars

"In Detroit, a large payroll and data-processing service bureau Ifound its1 PS/2's were formatted with the wrong version of DOS. The retailer who did the formatting corrected the problem by replacing system boards."

PC Week March 16 1988

Inc. ad in Datamation



In MIS Week (Murch 7, 1988), Release 3 of Lotus 1-2-3 appears to have the look and feel of Microsoft Word and Aldar's PageMaker



Meet your new typist.



Just like our old troist: letter scanned by the Saba Page Reader shows a comma added after one word and a period omitted after another in the on-screen version.

Have you seen anything offbeat or unusual about the compater industry? Send submissions to Communiqués, PC Magazine, One Park Avenue, New York, NY 10016. Print your name legibly; include the name, city, and publication date of any newspaper cli plug, and include your T-shirt size. Contributors receive \$50 and a PC Magazine Tshert. In case of duplicate entries, the earliest postmark prevails. Sorry, but entries can't be acknowledged

Winners this issue: Timothy Wolfe (Saba Page Reader), Vanisa Avant (1-2-3, Re-Jease 31, Terry Lunderan (monogram monitor), Damel Mass (20 mm, drive), David G. Graham (Geneve 9640), Addison K.F. Ching (tope dry), Pam Treban (6 disks for \$20), Dave Ramsey (PS/2 system boards), Joe Johnson (Carmen Sandiego), Jack Cook (CP&L). Peter Loshin (lightweight axygen).



dBASE Power for 1-2-3

Last year we met a crazy programmer who said he could build a database with the power and capacity of dBASE and put it inside 1-2-3. Well, he works for us now, and if you know anything about database programs, his baby is going to knock your socks off.

Introducing @ BASE, a full-feature relational database add-in for 1-2-3. Now arrone who knows how to use 1-2-3 is an instant database wizard because @ BASE turns 1-2-3 into a powerful "front-end" for database applications. It's as easy as 1-2-3.

Huge capacity

If you've every tried to use 1-2-3 as a database manager, there's a good chance you've run out of memory. That's because 1-2-3 stores data in the worksheet. @ BASE stores data on disk where record capacity is virtually unlimited. You'll never run out of memory again.

Brains and brawn

@ BASE compares with powerful standalone database programs like dBASE or R:BASE.® but it operates in concert with 1-2-3. You get the best of both worlds. 1-2-3 gives you tools for data analysis. @ BASE gives you big data canacity. Brains and brawn, It's a nice combination In minutes you can build a worksheet with

dynamic links to the database on disk. (The worksheet might present a sales recap by region.) Next month, for up-to-date results, simply See our ad on page 408

load and recalc the worksheet. Fresh database information is automatically linked from disk

Industry-standard file format

@ BASE uses exactly the same file format as dBASE III and dBASE III Plus dBASE is not required to use @ BASE. But if you have standardized on dBASE, @BASE fits right In. @ BASE reads and writes dBASE files directly. No conversion is necessary.

At less than a third the cost of dBASE, you may decide to use @ BASE instead of dBASE throughout your organization wherever users need easy access to dBASE information.

Serious Performance

@ BASE beats dBASE III Plus in benchmark tests.* @ BASE is up to 3.7 times faster!

	dBASE III Plus	@BASE
Locate record	12 sec	12 sec
Pack database	7.1 min	1.9 min
Sort database	10.8 min	4.5 min

@ BASE works with 1-2-3 Release 2 on the IBM PC, XT, AT, PS/2 and compatibles. Only \$195. No competing add-in database can match @ BASE for power, compatibility and performance. Nothing even comes close.

CIRCLE 282 ON READER SERVICE CARD

Introducing @ BASE (pronounced "at base")

@ BASE™ puts the power of dBASE III Plus® inside 1-2-3.8

With @ BASE you can:

 Instantly transform an on-sheet database to a dBASE-compatible database on disk. . Use 1-2-3 as a "front-end" for existing dBASE applications

· Build a complete database application from scratch using 1-2-3 to control database functions.

@ BASE Features

- · Huge capacity data is stored on disk . Occupies only 72K RAM + 8K per open file. . Fully compatible with dBASE III file format.
- · Flexible data structures: - Yable view
 - Form view - Crosstab view

* And much much more!

- · Powerful Query/Selection commands
- · Bi-directional data transfer between worksheet and database
- . Dynamic link between worksheet and data-
- base using new database @ functions. . Fully compatible with 1-2-3 macros
- . Multi-level sort (ascending/descending).
- . Global multi-field search and replace. · Create/modify database definition.

You can open, access and update multiple data files concurrently using special (a) db functions. An optional module, available soon, lets you "join" data files on one or more common fields, and support index files. Option price is \$89.95.

	(A)	D	٨	CI.	П	TM
(@	D.	A	D.	Ц	-

Please send me: __ copies of @ BASE at \$195 each. Include \$3.75 shipping (\$12 outside USA and Canada) MA residents add 5% sales tax.

Partnerst VISA MC AMEX Diners Check

*** ***

X1108







dBASE Users—Attack the Mac with FoxBASE+/Mac

New Frontiers, No Fears.

ForbaSE-Adac gives you the unprecedented ability to run your dBASE programs on the Macintools immediately—without changing a single line of code! But there's much more. With FoxBASE+/Mac you can create beautifut, Pobust applications that are truly Mac-like—using the familiar dBASE language to

Speed and Power.

FoxBASE+/Mac gives you speed to burn—plus the power and performance you've come to expect from Fox. In fact, FoxBASE+/Mac is by far the fastest database system available on the Mac today—up to 200 times faster!

View Window. The View Window is the master control

panel for FoxBASE+/Mac's graphical, non-programming interface. Use it to open and close files, set up indexes, establish relations, access BROWSE, and even to modify database structures!

BROWSE.

ForBASE-/Mach BROWSE feature brings new commelence and power to database display and editing You're in complete control—BROWSE lets you dynamically adiast the size and order of fields displayed, add or delete records, and split the window to show different database sections side-by-side. Together BROWSE and Vew Windows climitate the need to write programs for common database operations!

Integrated Graphics.

Copy and paste graphs, charts, diagrams and even pictures into your database instantly! FoxBASE+/Mac gives you the power to display these graphics, or merge them into reports and documents!

ForBASE and FOARASE - are trademarks of For Software dBASE and dBASE III PLIN are trademarks of Ashton-In Macistosh is a trademark of McIntosh Laboratory, Inc., licensed to Apple Computer, Inc.



You can create stunning screens like this with FoxBASE+/Bixe-immediately. This actual FoxBASE+/Mac screen photo illustrates the View Window, Command Window, Integrated Graphics, Memo field editing, Trace and Debugging Facilities, and the BROWSE feature.

Command Window.

gives both experienced developers and novice user ultra-convenient access to the dBASE command language—just type a command into the Command Window, and it's executed!

Get The FoxBASE+/Mac

Call (419) 874-0162 Ext. 760 for more information about FoxBASE+/Mac. Or visit your local software retailer.



FoxBASE+/Mac is part of the award-winning family of products from Fox Software. For two years in a row, FoxBASE+ has been given the prestigious Editor's Choice award by PC Maguzine, and secred an impressive 9.2 out of a possible 10 when tested by InfolWorld's Review Board!

Fox Software

Nothing Runs Like a Fox.

Fox Software, Inc.
118 W South Boundary
Perrysburg, 0H 43551
Telex: 5503040827

Making mis work



Despite assurances to the contrary, the MIS department faces continuing uncertainty about its role. Some of its problems are inevitable. Others are of its own making.

t's not easy being in the MIS department. Never was. Never will be.

Information is the lifeblood of American business. Computers as the heart, the pump that keeps the blood flowing, nourishing the entire organization. Once it was easy for the MIS department to know its role in the organization. In Know its role in the organization, to lead the computers, the communications equipment, the data, and the responsibility and the responsibility and the incredible deculational job of the judgment of the property of the computers of the control of the computers of the control of the co

I have a special affinity for those turbulent times: I was the end user, pleading for systems support, only to be duly informed by the Systems Priorities Committee that my need was indeed great and that they'd be getting to it in a year or two. I ran the information center before such things existed, doling out green-bar printouts and punch card decks, assuring my users that they'd have their reports in 2 or 3 weeks. I was also the systems consultant, designing and installing six-figure mainframe packages to address the awesome backlog in the systems department. I was the insurrectionist, too, selling revolution in 8-bit increments to a processing-starved popu-

That was in the late seventies and the early eighties. Then computing changed, permanently, Computers got small enough and affordable enough for end users to own. And yet, with a decade of personal computing now behind us, some MIS folks still can't reconcile themselves to the change. Here are a few test questions to

help you gauge where you and your company stand on the road to modernity.

WHO OWNS THE DATA?

Yes, the company owns the data, but I've seen too many instances where MIS overcontrols access toil. Why are we still fight on the consistency checks, the backups, and the rollback when the user screws up, and DP Audit is always looking over your shoulder. Yes, you advise the users and design their whole system, but then it's time to pull back. When you do not much handled the property of the property of the property of the company of the property of the p

IS CONNECTIVITY A WEAPON?

Some would have us believe that the time of user influence in the selection and pur-



chasing of PCs is over. Don't bet on it. While you folks in the MIS department are setting standards for 3270 caths, networking, and access software, users are being seduced by Q & A. DataBase, Quattro, and Harvard Graphics. Even if you have an iron grip on the purse strings, the savey users (the ones who read PC Magazine!) come to you with completed purchase orders and specific requirements.

Meanwhile, I've heard too many instances of "I'll can just get a 320 card into that machine, I can control it." Believe me, you don't want to control it. Sure, you'd've got to maintain standards, but you've got to maintain standards, but ween corporate computing and end-user compating. Don't saddle them with DaphyWrite' of the basis of some corporate standard DCA mumbo jumbo, especially if they're never going to exchange document swith people on 320 to a teach, a with no explication.

Remember data, the lifeblood of your organization. It flows through the cable. It's really an artery. You can't put phony restrictions on arteries. You can't make a blood supply conditional.

ARE YOU LOOKING THROUGH THE WRONG END OF THE TELESCOPE? I'm tired of big-iron guys who sneer at

I'm tired of big-iron guys who sneer at "micros." I'm surprised they still exist, but they even have their own newspaper to keep them up-to-date on the escapades of those cute little micros.

The machines these folks tend aren't the dinosaurs—they are. The only things mi-

COMPUTER DIRECT ii Not Be U Prices Expire 8-31-88

AND WE MEAN IT!*

Genuine IBM® Printer 81/2" Letter Size . 80 Column **Limited Quantities**



 Upper & Lower Case (with true lawer descenders)

 Advanced Dot Matrix - Heat Transfer Graphics With Commodore, & Apple Interfaces
 Ready to Hook Up To Serial Part Of IBM® PCir. · Low Cost Adapters For IBM®, Apple, mmodore, & Loser Computers

 Underline & Enlarged **Our Low Sale Price**

> List \$199 (Add \$7.50 shipping.*) Seagate

PC, XT & AT Compatible Internal Disk Drives

TEAC 360K - 54" Drive

 Double Sided/Double Density . Fits IBM PC. XT & Compatibles Half Height · List Price \$199 (Add \$5.00 shipping*)

TEAC 1.2 M - 51/1" Drive 1.2 Mega Byte Memory

• Fits IBM AT & Compatib Double Sided/Double Density List Price \$199

TEAC 720K - 3 1/2" Drive

 Double Sided/Double Density · Fits IBM PC, XT & Compatibles • Half Height • List Price \$199

(Add \$5.00 shipping*) TEAC 1.44 M - 31/2" Drive

• 1.44 Mega Byte Memory • Fits IBM AT & Compatibles Double Sided/Double Density

(Add \$10.00 shipping*)

(Add \$10.00 shipping*

720 CPS 15" Printer

Multi-Head Wide Carriage Printer With High Dot Resolution



 Print Speed at 214 LPM in Draft
 6 Print Heads Achieve High Dat Resolution In Higher Speed • NLQ Speed Of 47.4 LPM

* 136 Column Wide Carriage · IBM and Epson Mode Parallel Centronics Port

Our Low Sale Price

(Add \$14.50 shipping.*)

54" Floppy Disks Hi-Speed NLQ Printer **Double Sided** Superb Near Letter Quality **Double Density**

160 - 180 CPS



 Near Letter Quality Selectable From Front Par • Italics - Elite - Condensed - Pica Tractor/Friction Feed

 Centronics Parallel Part * Lifetime Warranty On Print Head

5 6 Month Replacement Policy For Printer Super Graphics

SK Print Buffer

Our Low Sale Price (Add \$10.00 shipping.*)

20 MEG Harddrive

 Supports MS DOS 20 Mega Byte Storage

Auto Boots When Powered Up

Floppy Disk Controller Included
 Fits IBM PC, XT & Compatibles
 Height - Tokes % the Room of Full Size Drive

Sale Price S

Seagate

Super Fast ST 251 40 MEG Harddrive

• 38 ms Access Supports MS DOS
 40 Mega Byte Storage

Auto Boots When Powered Up
 Height - Tokes % the Room of Full Size Drives

Sale Price \$ 2 0 (Add \$10,00 shipping.*)

List Price \$299

Minimum Quantity 50 (Add \$4.00 shipping.*) 100% Certified - Liftetime Guarantee Box of 50 \$9.50 (19' each)

(without sleeves) (with sleaves)

Box of 100 (no limit) ... \$24.00 (24' each) (with sleeves & labels)

Economy Sleeves ... \$1.00 per quantity of 50
Disk Labels ... \$3.95 per quantity of 100
Disk Notchers ... \$3.95 each

514" DS-DD Includes Disks. Sleeves, Labels & Write Protects

no limit (Add \$4.00 shipping.*) 100 % Certified * Lifetime Guarantee

Immediate Replacement if the disk ever fails!

Sold in lots of 100..\$24.00

15 Day Home Trial • 90 Day Immediate Replacement Policy

COMPUTER DIRECT 22292 N. Pepper Rd, Barrington, IL. 60010 Call (312) 382-5050 To Order!

residents and 61% while tas. All orders must be in U.S. Dellars, We ship to all points in the U.S., CANADA, PURATO SICO, & AFOO-if for charge record continemal U.S. or C.D.D. MAIL ORDERS enther enabler sheet, incomprosely, open must check. Allow 14 days of which for photo corders and U.S. or greates and Privac. sourcification at a wellands produce to deep source sector. Stoppes and another the contraction of the contraction of

VIIIA - MASTERCARD - CO D

COMPUTER DIRECT

is 1st in PRICE, SUPPORT, & GUARANT

5 MHz IBM® Turbo XT Compatible System Compatible Computer

15 MHz IBM® XT

16 MHz 286 IBM® AT Compatible Computer



- 512K Professional Turbo XT Computer • 360K Floppy Drive and Controller • *15 MHz (Norton CI Rating)
- MS DOS 3.2 & GW Basic • 12" Hi Res 35 MHz Monochrome Monitor · Genuine IBM® Printer With Interface
- · One Roll Of Heat Transfer Paper Word Processor, Spreadsheet & Data Base Complete DOS & System Tuto Included FREE!

Our Low Sale Price List \$1995

Super Fost S V20 CPU

- 512K Prafessional XT Turbo Computer
- 360K Floppy Drive and Controller
 15 MHz (Norton Cl Rating)
- MS DOS 3.2 & GW Basic Parallel. Serial & Game Port • TTL Manachrome Manitar Card
- Super Fast V20 CPU "AT Style" Keyboard Security Keylock & Clock Colendor

Our Low Sale Price List \$1195 (Add \$10.00 shipping.*)

mme. OS/2 . 80286 16 Bit Micro



- 1.2 MEG Floppy Disk Drive Parallel & Serial Printer Ports * *16 MHz (Landmark CPU Rating)
- 101 Key "AT Style" Keyboard 0 Wait State BiOS w/Built-in Support for 3'n" Drives
 Clock/Colendor & Security Keylock

\$8995 With Floppy/Hord Drive Controller Cord & 512K RAM Memory Installed **Our Low Sale Price**

List \$2295 (Add \$14.50 shipping.*)

(Add \$35.00 shipping.*) TTL Monochrome Monitor

- Anti-Glore Screen
- Audio Speaker Volume Control Black Matrix Tube
- Harizantal Resolution 260 Lines
 Includes Composite Cable

Our Low Sale Price (Add \$10.00 shipping.*)

IBM 300/1200 BPS **Card Modem**

- 1200 Boud Bell 212A/103 at 1200/300 BPS • 100% Hayes Compatible
- Automatic Dialing & Answ * Built-In Speaker With Volume Control Separate Vaice and Data Jacks Bath Touch Tone and Pulse Dialing
- Extensive Diagnostics Sale Price S

(Add \$3.00 shipping.*) List \$149

- Kiss Hco2 -

IBM 300/1200/2400 **BPS Card Modem**

• Full or Half-Duplex Operations • Haves Compatible

 Auto Diol in Pulse, Tone & Tandem FCC Certified and Registered Includes Software Auto Originate and Answer Mode
 Reverse Mode Dial

Sale Price S (Add \$3.00 shipping.*)

12" Hi-Res RGB **Color Monitor**



- Tinted Gloss
- .31 Dot Pitch • 690 x 240V Resolution
- · Non-Glore Screen Green/Amber Text Switch
- Doto Coble Included

Our Low Sale Price

(Add \$14.50 ehipping.*)

15 Day Home Trial • 90 Day Immediate Replacement Policy

COMPUTER DIRECT 22292 N. Pepper Road Barrington, IL, 60010

We Love Our Customers! CIRCLE 246 ON READER SERVICE CARD

■ BILL MACHRONE

cro about personal computers are their size and price. Any reasonably computerized and price. Any reasonably computerized end-user department has more mips, better throughput, and more modern equipment than your machine room. Application programs and development tools eclipsed their mainframe counterparts a while back.

IS YOUR MAINFRAME TOO BUSY? Connectivity and workgroup computing

are changing the way mainframes are used. Savvy systems designers are putting the processing tasks in the users' machines, where they belong.

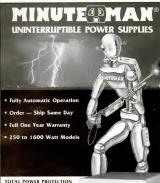
It's time to stop thinking in terms of ICCS screen. Why are we asking our scarcest resource—mainframe CPU cycle—to keep track of cursors, fields, and mapping? Remember the original \$270. Fee, with its capability for four sessions? Fee, with its capability for four sessions? Fee, with its capability for four sessions? See that the season of the season

Modem systems should be limited only by the number of transactions they can process, not by the number of sessions they can support. So let the PC have as many virtual sessions as it wants, but only one data stream back to the mainframe. Also, as PCs (and Macintoshes) get bigger screens and more interactive graphics, your pality 3270 screens are going to look pretty dumb to you trusters. They want your data, not your screen designs.

ARE YOU PART OF THE SOLUTION OR PART OF THE PROBLEM?

Over, under, around, or through you, the end user will have his data processing needs satisfied. Your job is to make it easy. Take a look at what you offer. Is it state-of-the-art? Or is it mired in a rehand of old ideas, locking you and your users into outmoded software and hardware?

Your information center should be a showcase for state-of-the-art computing. You need to have a working demonstration of what's possible, not what's approved. Yes, it costs a lot of money to select, train, and support new packages, but the cost is far greater if your constituents subvert you and write you off as outmoded.



Blackouts — Enables user to oper

- Brownouts User is protected from low AC voltage below 102
- Overload Protection Automatic shutdown in overload situation to
- Overvoltage Protection UPS runs on inverter (117 volts) when AC voltage exceeds 132 volts
 Surces Solkes Clamos transients
- above 200 volts with an energy rating of 100 joules or less. • EMERFI — Three stage filtering for
- EMI/RFI Three stage filtering for clean AC power
 Synchronized Sinewave* — Elimin-
- ates voltage reversal to input on your equipment

 • I Millisecond Transfer Time*

 Includes detection and transfer so your machine never notices loss
- of electrical power

 Two Audible Alarm Levels —
 Notifies user of battery usage and
- two (2) minute warning.

 LED Display Informs user of
- operation mode, power utilized on AC, plus "On Battery" and bat tery power status • Alarm Silencer — Enables user to
- silence alarm for quiet continued operation during battery operation

 Optional Sienal Port — Enables UPS
- to notify computer of loss of AC power to allow computer to backup or shut down

 "250 with and 500 water upins offer 4

msec transfer time. PWM wave form



54	ggested Retail	
250 WATT	120 Volt	\$ 359.00
300 WATT	120 Volt	\$ 549.00
500 WATT	120 Volt	\$ 699.00
600 WATT	120 Volt	\$ 899.00
1200 WATT	120 Volt	\$1499.00
LECO WATE	120 Vols	\$ 1000 00

230 Volt Units Also Available



1455 LeMay 1874 Telepho errollion Texas 75007 (214) 440

1-800-238-7272

FAX -214-446-9011 TELEX 140275 OMEGA





DACEASY" MAKES A WORLD OF DIFFERENCE!

DacEasy™ Accounting More Than 400,000 Growing Businesses Worldwide, DacEasy Accounting leads the industry as the number one selling, award-winning program Two-time winner of PC World's World Class Award and PC Magazine's Editor's Choice, DacEasy Accounting recently was named InfoWorld's Product of the Year. Again and again, DacEasy proves that it makes a difference.

In fact, it provides you with more than 700 reports and "what if" forecasting scenarios based on three-year historical information - great for projecting expenditures and revenue. And, in addition to the program, you'll find the 460-page documentation is written for ease of understanding with helpful hints. screens and examples.







Since its introduction in 1985, DacEasy Accounting, feature for feature, has won acclaim as the leader in accounting software. Now Version 3.0 features a new interface with transaction-oriented pull-down menus that makes it think like you think as a business person rather than an accountant. Readily installed with five quick questions, your business accounting is operating within 10 minutes! Choose the predefined Chart of Accounts that are tailored for service or inventory-based businesses, or modify. All seven modules (General Ledger, Accounts Receivable, Accounts Payable, Inventory, Billing, Purchase Order and Forecasting) are fully integrated. Data posted once is automatically posted to all other related modules saving you time and ensuring accuracy as well.



Naturally, out of the best-selling accounting program grew the need for related business programs such as DacEasy Payroll. The 3.0 version also features a new intuitive design, pull-down menus, flexible pay periods, current federal and state tax tables, automatic withholdings, printing of checks, W-2's and 1099 forms, and much more. It's no wonder DacEasy is the world's best-selling payroll and personnel management program!

Also new for 1988 is DacEasy Graph+Mate, a RAM-resident program that interfaces with DacEasy Accounting or Payroll. Its easy graphic reporting features pie charts, line charts, bar charts, stacked-bar charts and perspective bar charts. Plus custom file viewing, macros, pop-up calculator and notepad, and more make it the ideal companion.

DacEasy™. The World's Best Ongoing Customer Support and Training! Disk-based tutorials, FREE Getting Started Support, and a brand new video tutor are just a few of the many products and services Dac offers. Accounting and Payroll Tutors serve as on-screen supplements guiding you through installation to complete set-up with colorful graphics, sounds, primers and examples. And now, you can enjoy at your convenience DacEasy Accounting Video Tutor, a twohour VHS tape for a fun way to learn Accounting 3.0. Toll-free Extended Support plans and nationwide DacEasy seminars are also available.

A World of Difference in Price! DacEasy offers the growing business a world of products excelling in performance and price! Priced at \$99.95 each are DacEasy Accounting (all seven modules), DacEasy Payroll and DacEasy Graph+Mate. And for a significant savings is the DacEasy BonusPack which includes DacEasy Accounting, Accounting Tutor, DacEasy Payroll and Payroll Tutor, for only \$199.95. A great start to computerizing your

growing business the DacEasy way.

\$100.05 to Day Sof TM

CIRCLE 220 ON READER SERVICE CARD DacEasy Accounting's strength is its acFa capability for generating reports

that provide you with fast information and ultimately better management decisions.

We'll GiveYou Six Solid Reasons Why You Should oplications



All New Version 2.0

The Clarion Professional Developer Is A Total Programming Environment That Runs On Any IBM PC, PS/2, Or True Compatible With 384K Of Memory And A Hard Disk. The Retail Price is Just \$695, NOT Copy Protected.

ONAL DEVELOPER*

CIRCLE 134 ON READER SERVICE CARD

Siash Your Total Development Effort... From Prototyping To Completion

You'll get live results fast-even before you write the first line of code. Ideas become running applications in a Designer, the front-end application generator, allows

ou to produce major programs with no coding. It climinates prototyping as a preliminary step because design and source code generation are done concurrently. You can implement a dazzling color screen or a report in minutes. You'll probably never code a screen again!

Automatically Generate Commented Source Code For Your Entire Application The Professional Developer's Designer is the most

powerful application generator in the industry. It creates structured source code that is fully commented. You can easily add to it, modify it, or just admire it. And The Professional Developer is a complete development environment with all the tools that you need.

Create High-Speed, Bullet-Proof Data Management With Built-In LAN Support

Advanced techniques allow you to tune your data management to fit each application. Use related files, o encryption, memo fields, automatic recovery, and commit and rollback-all without compromising Clarion's high level of performance. And complete LAN features are included so the applications you develop will run on your network without any additional run-time or LAN PACK cost.

Interface To Your Own C or Assembler **Routines For Special Requirements**

The Professional Developer will support special device stines and complex logic written in C and Assembler You won't have to completely re-write all those existing procedures. You can produce completely open-ended solutions that can grow with your needs or requirem

Produce Executable Programs That Don't Need Run-Time Systems

Compile your application into an .EXE program that will run on a stand-alone computer or workstation so you can distribute your programs without costly run-time systems.

Get Started Immediately. You'll Be Productive The First Day.

Although there's a lot of horsepower "under the hood," you'll be producing programs soon after you open the package. You'll find the whole environment friendly and comfortable. PC Week says: "Clarion is easy to learn and easy to use."

And One More.

We'll Give You A Free Preview! See Your Dealer Or Call Toll Free

(800) 354-5444 For A Free Copy Of Our Tutorial

Diskette And Introductory Material (Or, simply return this coupon)

Clarion Software 60 East Sample Road, Pompano Beach, FL 33064

The ugly reality: unix is in your future



With the imminent unification of all Unix systems into one specification, PC users face the dreaded possibility that someday they too may have to learn Unix.

In its can be traced back to Bell Labs-Murry Hill, where (according to the Unix litany) a fustrated programmer ammed Ken Thompson decided the world needed an operating system arise programming projects. Something transportable from machine to machine store porgamming projects. Something transportable from machine to machine project derivately claim was a weekend, Thompson invented Unix. That was in William Charles and Char

While A T& I at Inst made it difficult to get licenses for Unix, it numed out to be the get license for Unix, it numed out to be illy cloned. By the end of the 1970s dozens of Unix clones were plaguing the market. Cromenco had one called Micronix. Motorola had commissioned a Unix-like over the properties of the Commissioned a Unix-like of the Commissioned a Unix-like of this came to a standfull when A T&T released a number of cheap permanent is censes for the source code; Micronic bought one and rolled out Xenix, which more or less became the standard Unix for more or less became the standard Unix for

Nearly a decade later, slick Unix houses such as the Santa Cruz Operation appeared with schemes to popularize Unix. IBM rolled out a Unix clone and so did Apple. Unix interest in the past year has jumped.

Not unaware of this trend, AT&T has teamed up with Sun Microsystems to begin the great unification of all versions of Unix into one great pooh-bah—the be-all and end-all Unix. Eventually Xenix and all the old Unixes will be one specification. There is a question as to how the new Unix will be marketed, but indications are that it will be cheap. While some vendors are justifiably suspicious of the Sun/AT&T alliance, few figure that Unix should remain the mess that it is.

The big selling point of Unix is that it is relatively easy to implement on new microprocessor architectures. With Unix comes the popular programming language comes the popular programming language as RISC-based screamer—can have a lot of osoftware waiting for it once it comes off osoftware waiting for it once it comes off the assembly limit. In essence, Unix has become less of a programmers' tool and more of a marketine ploy.

Unix trade shows, once the domain of hackers, are now the domain of marketing types. It's a new game and here's the pitch.

Instead of a hardware company having to design an operating system for its new machine and then persuade hundreds of third-party guys to write code for the sys-



tem, they can have it all right away by subscribing to this Unix sales pitch. This pitch isn't new, but the market for hardware has changed over the past decade. It costs more to design and market a machine than it did in 1978. Unix saves money.

Apple and Commodore may be the last PC companies that took the do-it-yourself route with the Mac and the Amiga and their proprietary OSs. Amiga still hasn't the third-party support in toceds to expand its appeal. Apple managed to attract some of the best in the business, but it doesn't want to go through the process again.

The alternative is to buy into the Unix spiel. Apple indicated that it wanted to hedge its proprietary bet and actively support Unix development, and so it released AU/X—Unix for the Mac II. Even IBM, fearful of a bandwagon runaway, keeps saying that AUX (its Unix Cone) will be an important part of future strategy.

Basically, everyone is fearful that Unix will suddenly catch on-despite its roots as a hard-to-use techie-nerd OS. A new user interface is all that's needed, say the boosters. In their favor are the slew of new chips headed for us: the 68030, 68040, 88000, the mips RISC chip, the SPARC chip, the 486. The lag time to implement a complete system based on a new chip is becoming shorter and shorter, forcing concessions. There won't be time to write a proprietary OS. Look how long OS/2 is taking for its full implementation. Instead, the possibility exists that Unix will be thrown on everything that comes along. Do we, as PC users, have to learn to use Unix someday? 1 sure hope not, but I wouldn't ignore it.



UNLOCK ITS FULL 386 POWER WITH SCO XENIX 386 - NOW!

Under DOS, the COMPAQ DESKPRO 386/20" is a powerful single-tasking, single-user system that can run thousands of DOS applications. In 16-bit, 8086 mode.

One at a time.

When OS/2" software becomes available, this computer can become a multitasking, singleuser system running in 16-bit, 286 mode that can also single-task those DOS applications under OS/2.

One at a time.

With DOS or OS/2, it will support one user—for the cost of the entire system.

Under SCO" XENIX* 386, however, the COMPAQ DESKPRO 386/20 becomes a powerful multitasking, multiuser system that can run thousands of proven XENIX applications. In full-tilt, 32-bit, 386 mode.

Many at a time.

Using SCO VP/ix," it can multitask all the same DOS applications under SCO XENIX.

Many at a time.

With SCO XENIX 386, this powerful computer can support multiuser configurations of 16, 32, or even more workstations with such blazing performance that individual users will believe they have the whole system to themselves—at an unbelievably low cost per user.

> And the best news is that you can unlock the full power of the COMPAQ DESKPRO 386/20 today because you can get SCO XENIX 386—pow!

> > SCO XENIX System V and the SCO XENIX family of software solutions is available for all industrystandard 8086; 80285, and 80286 based computers, and the IBM® Personal System/2** Models 50, 60, and 80.



(800) 626-UNIX (626-8649) (408) 425-7222 EAX: (408) 458-4227 TWX: 910-598-4510 sco sacz uucp:... decvaxt microsoft!sco!info

a specific financial coll financial (security and the collection of the control of the control of the collection of the

INSIDE TRACK

Is the 80286 Chip Dead? And the search for the perfect portable computer continues.

As this issue hits the stands, the debate over processor chips will be under way. The question: Is the 286 chip dead? Now that the Intel P9 (called by some the 803865X, and obviously named after a Nissan) is going to be used by Compaq, what will happen to the 80286?

Most observers feel that the 80286 will become the dominant chip for cheap low-end speed burners. This contrasts with earlier theories that said the P9 chip (essentially a 16-bit version of the 80386 chip) will kill the 286. The real target is the 286 second-source company, AMD (Advanced Miero Devices), which has been at thorn in Intel's side since it began increasing, land cheeper than the advanced with the company of the property of the pro

Intel figures that it should keep the profitable 386 to itself, assuring skittish vendors that it will be able to keep up with the demand. At Comdex in Atlanta everyone was grousing about how Intel is swamped and already starting to allocate 80386 chips. The 25-MHz version of the chip is a real laugh. A fiasco began when someone at Sun Microsystems claimed that only Sun (a newcorner into the ranks of those who use Intel microprocessors) would get all the early runs of the 25-MHz chip for its newest workstations. This caused an incredible furor amongst longtime customers, although Intel denied the allegation. Evervone was sure that Intel would pull just such a stunt. Intel, meanwhile, furiously provided one or two 25-MHz parts to evervone who complained.

Anyway, everyone is convinced that the P9 is targeted at AMD and is missing the real threat: Harris, Harris makes the

hot version of the 286. It's a fully static CMOS chip, as opposed to the plainvanilla Intel CMOS chip. The Harris 80C286 is a speed burner. Except for possibly Cypress Technology, Harris is the top domestic CMOS manufacturer. Already the portables from Zenith and other vendors use it at a leisurely 12 MHz. 16-MHz parts are also available. Gordon Campbell, honcho at Chips and Technologies, told me that they took a 16-MHz Harris chip and easily ran it at 30 MHz! Furthermore, the chip is cheap and easy to design around. The advantage of static CMOS is its low power consumption-ideal for portables and machines of the future.

The P9 may never reach the speeds already achievable with the Harris 286 chip, and the only sales pitch for the thing in new machines is the lure of 80386 compatibility.

It's a different story for old machines. It seems that a small piggyback board that plugs into the 80286 socket will be available from many vendors by year's end. If I had a 6- to 8-MHz AT and wanted to soup it up. I'd buy this device.

Perhaps the 80286 is a doomed chip; the 8088 has been doomed for years but still sells like hotcakes to the budget-conscious. The 80286 will probably replace the 8088 in that role in the next few years. But will it go away? It seems unlikely, even though it is not the chip of choice.

Portable of Choice Dept.: I mentioned the Zenith portables above and I now have moved from my Z-181 to a speedy Zenith 12-MHz. SupersPort286 with a 40MB 27-millisecond-accesstime hard drive, double-scan backing screen, and 3-hour battery clip on. This scream ruses the Harris 286 and the newest Conner Peripherals hard drive,

which it operates at 2 watts total power consumption! There is no question that this computer is the portable laptop of choice, but it's still not perfect. While the double-scan LCD is sharper than ever, the small cursor seems to be more easily lost on the screen than with older units. And although the company has properly placed the Ctrl key next to the letter A on its newest 8088 laptops (both great machines to replace the 181 and 183), it has idiotically placed the CapsLock key next to the letter A on the 286 machines. It seems to me that since the 286 mimics an AT. Zenith would assume an AT-type keyboard with the Ctrl key placed next to the letter A.

How this insanity happened is a mystery, since the machine was designed by Howard Fullmer, an engineering whiz and a stickler for details. Other than that, there is little to complain about. I highly recommend the entire Zenith line of portables. You should be able to find a software patch for the keyboard.

The company also released a pricey 80386 machine in a decidedly ugly box designed to compete with the decidedly ugly Compaq 386 luggable. It

doesn't impress me as much as the 286s. At Comdex Atlanta, there was talk about an upcoming NEC Zenith-killer that will attack the biggest complaint everyone has about powerful laptops: the weight. The Zenith weighs in at a hefty 13 pounds, the same weight as a bowling ball. Add to that the accessories and power supply. Who, except an exercise nut, wants to lug a bowling ball around an airport? I do it because I can't use the alternative laptops with their squished screens and unreadable displays, Sorry, Toshiba, that's the way I feel. So NEC is supposedly readying an expensive (but worth it) 6-pounder with a perfect backlit display and 5MB or more of silicon memory to be used instead of a hard disk. The entire design is oriented toward light weight. I'll wait and see.

No Matter How It's Protected, Be Sure You Can Back It Up.

Several products can back up protected software. But only two are tough enough to handle even the trickiest protection schemes.

Copy II PC. for just \$39.95, backs up more protected software than any other program. What's more, it can remove copy protection already on your hard disk. PC Magazine calls it the "easiest of such programs to use." And now, with our menu-driven Noguard, it's a snap. Copy II PC easily handles Lotus 1-2-3 and over 100 other top-selling programs.

For the ultimate solution, try the Copy II PC Deluxe Option Board. For just \$159, it gives you the same advanced



technology used by commercial disk duplication firms. PC Magazine reported it "could not find a program this board couldn't handle." It's so powerful, in fact, it even lets you read and write Mac data files in a IBM PS/2 Model 25 or 30, or a PC or AT with a 3.5" internal drive.

No matter how it's protected, be sure you can back it up. For the dealer nearest you, or to order direct, call (503) 690-8090,

M-F, 8 a.m. to 5 p.m.

Central Point

Copy II PC (West Coast time). (College Option Board)

"There's No Reason To Look Beyond

-PC Magazine, Editor's Choice Award, Two-Time Winne

Data Recovery · Fast Hard Disk Backup · Disk Management

Now we've given you even more reason-PC Tools™ Deluxe.

PC Tools Deluxe gives you all the best features of Fastback," Norton," XTREE," Mace," Sidekick® Lightning™ and Disk Optimizer-a \$700 value-for just \$79.

Other utilities may claim they "do it all," but only PC Tools Deluxe delivers:

 A DOS shell so complete 80 Micro called it their "overwhelming choice based on versatility, ease of use, and cost." . The best UNDELETE available-instead of merely "guessing," it recovers all data even on fragmented files.

 HARD DISK BACKUP as fast and every bit as reliable as Fastback. • The leading UNFORMAT for hard disks and floppy disks, enabling you to recover from many disk disasters.

. PCFORMAT for safe formatting of floppy and hard disks.

· A quick, reliable DISK CACHING utility for speeding up disk access.

 A fast COMPRESS feature that like Disk Optimizer dramatically improves hard disk performance. . And a better resident mini WORD PROCESSOR than Sidekick, including word wrap, search/replace, formatted page printing and more.

Before you buy any of these other utilities, take a look at PC Tools Deluxe. Like PC Magazine, you'll find there's no reason to look any further. For the dealer nearest you, or to order direct, call (503) 690-8090, M-F. 8 a.m. - 5 p.m. (West Coast time).

CIRCLE 120 ON READER SERVICE CARD



Central Point

15220 N.W. Greenbrier Pkwy. #200 Beaverton, Oregon 97006 (503) 690-8090 Sales/Info (503) 690-8080 Tech Support



Introducing REMOTE² It's never been so easy to do so much in distant PC operation.

Until now, to have this kind of flexibility and control over a host PC, you'd have to be in the same room.

Now, even if you're thousands of miles away, REMOTE²

allows you to operate a host PC's application software with total control and exact mapping of the host keyboard. .fast file transfers even while an application program is running ...remote printer redirection...an error-checked, datacompressed link even with conventional modems...and CGA color graphics.

REMOTE² comes in two parts-R2HOST and R2CALLavailable together or separately, so you can create the combination to meet your exact needs. R2HOST is also accessible from most terminals and terminal emulators. REMOTE' is packed with features users have asked for \(\) A choice of three distinct automatic and manual answering modes. Directory-to-directory file transfers using a half-screen display of host like, Proprietary file transfer protocol with redundant file skipping and partial file recovery (other popular protocols also supported), \(\) A "Phone Book" that facilitates one-entry calls from listings of names, numbers, and passworth, flost call-back capability linequared, context-sensitive hole posem. LAN dominant access to an IBM host with IBMA.

Discover the new remote control program from the makers of CROSSTALK. Ask your dealer about REMOTE; or write us.

REMOTE²

CRCLE 278 ON READER SERVICE CARD CROSSTALK COMMUNICATIONS/1000 Holcomb Woods Parkway, Roswell, Georgia 30076/(800) 241-6393

A Division of Digital Communications Associates, Inc. cicc.

CROSSTALK is a registered trademark of Digital Communications Associates, Inc. CASL, BMA and So. Alex are trademarks of Digital Communications Associates, Inc. Computerors is a registered trademark Computerors, Inc., and IARE Book (Company).

DON'T LET THE BETA BUGS BITE



The definitions of ''gold disks,'' ''alpha software,'' and especially ''beta software'' need refining if the software development process is to function properly.

what's happened to the management of software development in the PC business. New programs often appear years later than promised; upgrades are shipped months or even years after they're due.

Part of the problem arises from the mumbo-jumbo connected with alpha soft-ware, beta software, "gold disks," and the rest of it. Vendors speak of programs entering 6-week beta-testing phases, although meaningful beta testing takes far longer. And when we hear the vendors' predictions, we foolishly believe them. because we want to, because we have the problem of th

eager to get our hands on those new pro-

grams.

ASIMPLE TIME Until the last year or so, the rules and definitions have been pretty similarly. In general paper, and the property similarly and the property similarly and the property similarly to allow and the similar last paper to allow and the similarly existing. It included those very preliminary versions where most or all of the features were "turned on," but the vendor know they weren't nearly reliable enough for widespread use and testing of the program.

By contrast, beta software was hardly robust, but it was at least reliable enough to the a small cadre of outsiders participate in the testing (and in the case of upgrades, the outsiders usually included a goodly number of power users of the existing product). Beta software had everything turned on and virtually everything working—although it still wasn't reliable enough to turn loose on the paying public. Bugs, while they were numerous, rarely had catastrophic results, such as losing data. Debugging code was still included in the beta versions, which meant they were both larger and slower than release versions should be

Finally, vendors turned out that "gold disk," or locked-up version, ready to duplicate and ship. Everything worked, and while a few known bugs might still be lurking in the product, none had serious consequences.

DRAWING A FINER LINE: One problem with managing software development is that those definitions are just too coarse. In practice, much finer gradations exist and need to be acknowledged, especially in beta-level software. Accepting that fact leads to greater candor and caution on the vendor's side, and perhaps to more reasonable expectations on our side.

Pete Peterson, the Executive VP of



WordPerfect Corp., is a witty, direct straight-shooter. WordPerfect has taken its lumps recently on shipping late—Word-Perfect 5.0 for the PC shipped much later than anyone expected, and the company's version of WordPerfect for the Macintosh was mure than a year late.

So Peterson has gotten used to being ribbed about slippage in new-product shipping dates. But that hasn't taken away his wit or his directness. The sobering experience of shipping two major products late has led Pete to develop his own set of definitions of beta-level software.

Though there's a little that's tongue-incheek afoot here, there's also a lot of truth. You'll find Peterson's Five Stages of Betas interesting:

Stage 1: The coding is finished and the design problems are solved. Normally, the beta version goes out while unsolved problems still exist. Everyone solved problems still exist. Everyone thinks the coding has been solved, but it really hasn't been. People call in with bugs, and as you fix them, major design problems crop up. The end of Stage 1 is reached only when the coding is really done and the (undamental design problems

Stage 2: The program becomes usable. Even though bugs exist, you can actually do something worthwhile with the program.

are fixed.

Stage 3: The big list gets shorter. During the early stages you find more bugs than you fix. But at some point during this stage, you pass the hump in that curve and start down the other side, fixing bugs faster than they're turning up.

■ JIM SEYMOUR

Stage 4: You get down to the short list. You can tell you've hit this stage when you can count significant bugs on your fineers.

have the horrible, queasy feeling that bugs are still lurking. Software companies usually ship buggy software when they are in Stage 5, and can't-or won't-Stage 5: No known bugs exist, but you | or don't-give the program time to set and |

cure a bit. Within 2 to 3 days or even hours of the first shipments you always find a horrible bug, which means you have to tcar everything down and start manufacturing again.

How true, Pete, how true.

NOT A PRETTY PICTURE I've been a part of a lot of beta-testing programs, sometimes from the inside. Often, the process isn't a pretty one. To the old joke that there are two things that no one should ever see being made-sausages and laws-I would like to add software. Denving reality becomes the norm as the third or fourth delayed shipping date looms larger and

No matter how fat the stacks of bug reports, no matter how hard earnest betatesters argue against shipping the product

 Often, the beta-testing process isn't a pretty one. To the old joke that there are two things no one should see being made-

sausages and laws-I would add software.

in its present form, management is always loath to wait a little longer. Especially to let software that looks ready merely "set and cure" for a few days.

I understand the business imperative: the costs have been accumulating for some years, and whether they have been capitalized or expensed, management is understandably eager to start booking income

against those costs. But shipping software that's not yet ready only increases those costs by forcing

crash programs to produce 1.01 versions and then giving them away to dealers and users. And it also erodes any software company's greatest asset: customer confidence in its products. Better late than buggy.

Didn't You Read This Before You Sent It To Me?



Who's Watching The Grammar, Style, Usage And Punctuation In Your Business Writing?

You know how it is. You're working hard. You're under pressure. You have to get a special report or memo to the boss. Or a proposal to a client. You work furiously to meet the deadline.

Now all they remember are the errors Helps You Improve Your Writing. Now RightWriter, the expert grammar and

style checker, helps improve your writing...right away. RightWriter is an expert system. It applies over 3,000 grammar and style rules to your writing to make it stronger, clearer and more powerful. Excellent Learning Tool. RightWriter is also a superb learning tool because

encourages you to think about your writing-RightWriter flags errors in grammar, style, usage and punctuation right in the document. Then it suggests practical ways to improve what you've written. But it always lets you decide whether to Tracks How Your Writing Improves.

RightWriter does more than just correct gram mar. It gives you specific scores on readability. strength, descriptiveness and use of jargon in your writing. It even lists uncommon or problem words Copengle: 1988 Raghelich, Inc. Right-Veter is a regiment malemark of Raghelich, Inc.

Supports Leading Word Processors. RughtWriter is the perfect accessory to your IBM

or compatible PC or PS/2's word processor. It supports all the popular word processors such as WordStar, Microsoft Word, WordPerfect, 8 PFS: Write, 8 MultiMate® and many others. RightWriter Is Easy To Use.

Since it has only one command, RightWriter becomes an automatic part of your business writing.

See Your Dealer, Or Call RightSoft at (800) 992-0244

30-DAY MONEY-BACK GUARANTEE RightSoft, Inc.

4545 Samuel Street, Sansona, Florida 34233 Visa, MasterCard and AMEX accepted. Add \$4.00 for shipping





"Within the first couple of hours INFO® was

worth the day."
That's what Robert Alston, Director, Information and Systems Services, who visited from The Stroh Brewery Company of Detroit said about last year's event.

This year, INFO will be worth your time too! It's the one event showcasing systems and solutions for all your information management requirements.

For 15 years, 1NFO has offered the entire spectrum of new ideas and solutions. Today more than ever INFO is your best source for all the newest technologies . . . ISDN. SNA, micro-to-mainframe links, fourth generation languages, relational database systems, data security, voice/data integration and much more.

INFO '88 will be a showcase of innovative products and services from virtually every important manufacturer Unisys, Hewlett-Packard, IBM, Honeywell Bull, Lotus, NEC, Wang, Ashton-Tate, Prime, Xerox, Digital Equipment Corporation, Computer Associates and hundreds of others

Special "Show-Within-A-Show"

The Transparent Computing Environment " presented by Control Data, will be previewed at INFO.

Enter the Transparent Computing Environment " and discover innovative solutions to multi-vendor connectivity and integrated information management. Experience real-life applications in a variety of business settings.

Transparent Computing Environment is a trademark of Control Data Corporation.

- Systems Management
- Software
- Hardware Trends
- Emerging Technologies
- Multi-Vendor Connectivity
- Communications
- Networking



Information Management Exposition & Conference

Jacob K. Javits Convention Center • New York, NY Show hours: 10am-5pm daity

Call 1-800-255-7798. We'll send you a Discount Registration Form worth \$15! (in Connecticut. call 964-8287)

COOL, QUIET POWER

SILENCER 150

HTRA OURE

- PC/XT compatible • 150 watts of power
- · aystem runs 5°-15° cooler · 84% noise reduction

\$129

TURBO-COOL 150



- HOGRADE
- PC/XT compatible 155 watts of power
 system runs 25°-40° cooler

 50% noise reduction \$149 TURBO-COOL 200



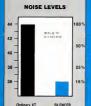
HIGHEST DERFORMANCE

- · PC/XT/Mini AT compatible . 200 watts of power
- system runs 30°-45° cooler · standard noise level

\$189

EXPANSION CARDS TEMPERATURE TEST





· AT compatible . 200 watts of power

TURBO-COOL AND SILENCER POWER SUPPLIES: POWER PACKED AND BUILT TO LAST

- · full rated power
- · low ripple; tight reg.
- · heavy duty components FCC-B compliance
- · UL (#E114179:TC150/200) . OV. OC. SC protection
- · patented twin fan slope-cover design for
- max. cooling vs noise (TC150/200) . high capacity West German cooling fan w/adjustable speed control (TC250)
- · Installation instructions; 4 drive plugs · rigorously tested; 1 yr. warranty

SILENCER 200



- ULTRA QUIET
- adjustable cooling (1.0X-1.3X) • 69% noise reduction @ 1.03

TURBO-COOL 250



- AT compatible
- 250 watts of power
- adjustable cooling (1.3X-1.6X) . 386 boards and hard drives run up to 35° cooler \$189

ALSO AVAILABLE

	ALGO AVAILABLE
ı	Computer Replacement Fans (West German & Japanese)
ı	Turbo-Cool PC/XT Auxiliary Cooling Unit (system runs 15°-30° cooler) \$5
ı	Turbo-Cool AT Auxiliary Cooling Unit (system runs 15*-30* cooler)
ı	Compaq 150W Power Supply (upgrades the original portable)
ı	Turbo-Cool 150X Industrial Power Supply (92% dust reduction)
t	Custom Turbo-Cool Power Supplies (remote on/off, special loading, etc.) CAL

\$169

VISA/MC/COD/PO

PC COOLING SYSTEMS, INC. 31510 Mountain Way, Bonsall, CA 92003 (619) 723-9513

<u>Z</u>man Technologies

DISTRIBUTED BY TUSSEY COMPUTER PRODUCTS



Swan XT10 th Swan/MS DOS 3.3 Acc 589

10MHz

omplete System with Single 90K Orive & Monographic ontor Assembled & Tested IM ® XT Compatible

- 10/4.77 MHz 8088-1CPU ■ 640K of RAM ■ 150W Power Supply
- Ports: (1) Senal, (1) Parellel, (1) Game
 Expansion Slots
 101 Key Enhanced "AT"
 Touch & Click Style Keyboard
- Clock Calendar w/Battery Backup Harcules Competible

Video Card (720 x 348)
Quality Hi-Resolution Am
Monitor w/Tilt & Swivel

Swan AT12 12MHz



80286 12/8 MHz (Keyboard Swinchable) 11.7 Norton S.I.Rating 640K of RAM on 1MB Motherboard 200W Power Supply Ports: (1) Serial: (1) Parallel, (1) Game Dual Floppy/Dual Hard Drive Controller Mono System w/40MB Seagata HD #251\$1495

Mono System w/80MB Seegeta HD #4096 \$1799 Base Unit w/o

Monitor or Video Cerd\$959 Quality Hi-Resolution Amber Monitor w/Tilt & Swivel

> **Option Upgrades** for XT10 & AT12

Dual Floppy/Dual Hard Drive Controller (8) Expansion Slots 101 Enhanced *AT* Touch & Click Keyb Clock Calendar wilbattery Backup Harcules Compatible Video Card (720 x 348) w/Perellel Port (2nd)

High Speed Hard Drives For the AT12

Monochrome to Color System, with CGA gard and RGB Monter Add.....\$170

Miniscribe 3053 (40MB) 25 ms Accessru Miniscribe 6085 (71MB) Seagate ST-251-1 (40MB)

Seagate ST-4096 (80MB)

Call For Information & Pricin-

30 OAY SATISFACTION GUARANTEE
Your complete satisfaction is our top profity. Any Swan computer system may be returned within 30 days from the date of shipment for a full refund."

FOR YOUR PROTECTION WE GO THE EXTRA YEAR A full 1 year warresty is included, with a 2nd year SEW (Swan evaluable, Call or wree for detects

FAST DELIVERY ... We ship within 24 hours. "

TECHNICAL SUPPORT Our support staff is on call 9.5 Mon-Fin byour questions and make sure that you get the most from your system "There returned must be as new without modication or damage. All watershy codes mercals and packaging must be violated. Represent shaping in sub-present and mustred, bearing a RAC [Retern Authorization Code); on the thipping likel in "Custom Systems May Task Longer and Institutions."

Swan AT-Style Keyboard ■ 101 Key Enhanced AT "Touch & Click" style Keyboard ■ XT & AT compatible

\$69 Full 1 year warranty

Mono System

w/Dual Floppies\$729 ono System w 20MB Sengata HD . \$959 tono Systam .\$9991 w/30MB HD

Base Unit wio Mondor or Video Card ...\$549* *Sysple 360K Flaggy Days

Swan Video Cards

PARALLEL PR

\$129

Swan Modems

1200 baud internal\$69 2400 baud external ...\$135

To order by mile: We accept many gride comisso from passage latent. As on a week to be caused to the passage of the passage o





OPEN: 8:00AM-9:00PM Mon-Fri: 10:00AM-6:00PM Sat. 12:00PM-8:00PM Sun EAST COAST TIME

DON'T SETTLE FOR LESS...



THOMSON ®

4570 Includes EGA 480 video card at no additional 14" MULTISCANNER MONITOR

640 x 480 resolution CGA, EGA, extended

Graphics

EGA and PGC \$479 Page Perfect

■ Desktop Publishing ■ Word Processing

Insi

All in One \$295

HIREZ

MOUSE

- Uses 62% less
- EGA & VGA



SERIAL MOUSE

Swan
Technologies

MODEM w/PC Talk III Software

2400 baud internal ... \$119 1200 baud internal \$69

2400 baud external ... \$135

1200 baud external \$89

\$79

WordPerfect **VERSION 5.0** Document Processing NOW SHIPPING!

SIDEKICK'Plus













MAGNAVOX

7749 . 14" FLAT MONOCHROME MONITOR

■ 17 VGA Modes ■ 64 Shades of Grey

■ Tilt/Swivel Base

14" COLOR MONITOR ■ 17 VGA Modes

Analog Input Allows Virtually Unlimited Numb ■ Tilt/Swivel Base

MICE

MICROSOFT

MONITORS

WE CARRY A FULL LINE OF MACINTOSH PRODUCTS!

EDUCATIONAL and CORPORATE ACCOUNTS



SHIPS IT

SOFTWARE

	-
BEDFORD	
Integrated Accourang .	\$T99.0
BOEING	
Boeing Calc	\$209.0
Boenng Craph	\$189.0
BRODERBUND	
Graphics Library Disks	\$34 B
Print Shop	522.0
Print Shop Comparison	£22.0
Toy Shop	
rey orey assessment	3422
CENTRAL POIN	r
COPY # PC	\$27.0
Dalute Option Board	\$109.0
PC Tools Deluxe	
DAC SOFTWARE	
Onc Easy Accounting.	982 9
Dao Easy Acct, Tutor .	SCAL
Oec Easy Payrol	\$30.0
Dag Eesy Payroll Tuto	SCAL
FIFTH GENERA	
FIF IN GENERA	HUN
Fastback Plus	

ENERIC SOFTWARE CADD 3-D Modell CADD w/Dot Plot OTUS

MICROPRO	\$101.0
Wordster 2000+	-SCAL
Wordstar Prof Rel 4	\$229.0
MICROLYTICS	
GOW	\$37.0
Word Finder	532.9
MICRORIM	
DB Graphics	\$189.0
Rifflage for DOS	\$439.0
R/Base for DOS	



MICROSTUFF







Professional Plan Professional Write	\$79.00 \$79.00 \$115.00
SPRINGBOARD	
Cip Art I or III	
SYMANTEC	
C & A White	\$199.00 \$115.00
TURNER HALL	
SQZ Plus	
WORD PERFECT	

	Executive	\$127.00
	Library	264.95
	Plan Perfect	\$199.00
•	Wordperfect (5.0)	SCALL.
	XEROX	

EDERA

Software orders over \$100 and Accessories under 6 pounds will be shipped Federal Express (Even et these prices) You only pay TCP's stenderd shipper change of \$4.00 per order. Orders arriving before 3:00 PM of time will be shipped out sams day. If pan of your order is bad ordered the remember will be shipped UPS Ground FREE!



SECURITY

■ Your Credit Card is not charged until your order is shipped.

■ We instar your order at no extra cost to your cards you see Inencially strong end well applications and company.



HARDWARE

PC HARD DRIVES MiniScribe Seagate

ST-225 w/cont.20MB (65 ms) .\$259.00 ST-238 w/cont.30MB (65 ms) .\$299.00 ST-251-0 40MB (42 ms)\$379.00 ST-251-1 40MB (28 ms)\$489.00

INCIDENTIA	
7613 TTL (Green)	589.00
7623 TTL (Amber)	\$89.00
8762 RGB/CGA	\$249.00
8515 RG8/CGA	\$289.00
8053 EGA	\$349.00
8873 EGA Multimode	\$479.00

\$319.00 MSP-45 SCAL





CALL FOR PRICING ON EPSON PRODUCTS

CIRCLE 268 ON READER SERVICE CARD OPEN: 8:00AM-9:00PM Mon-Frl; 10:00AM-6:00PM Sat, 12:00PM-8:00PM Sun EAST COAST TIME





Above&beyond the call

AST 5251-11 +

Monitors Amdek 210A

Irma/2 PCA/MCA

NEC MultiSync II

Princeton HX-12 +

Semsuno Color

Printers/Plotters Epson FX-286E

Epson LQ1050

HP Leseriet II

HP 7475A

NEC 3550

NEC P2200

Okidete 320

Okidata 321

Okidete 393

Penesonic

Okidete 293E

The Complete Hand Scanner

Mass Storaga/Backup

Plus HerdCerd 40MB

Seegete ST 225 W/int

Seegate ST238 W/int

Keytronics KB 101

Peintshow

Microsoft Mouse

Accessories

Curtis Ruby

PC Mouse w/Paint

DataShield S-100

Mesterpiece Plus

256K Ram Sat

8087 Meth Chip

Logicel Connection

80287-8/80287-10 \$289/\$339

80387-16/80387-20 \$529/\$775

*CALL FOR SHIPPING COST

Logitech Hi-res Mouse Logitech M8 Mouse W/

Seegate ST251-1

Sysgen Bridge

input Davices

Toshiba P321SL

Toshibe P341SL

Toshiba P351M2

Bernoulli II Dual Irwin Tape Drives \$ Cell Mountain 40MB Int Tepe \$ 389 Plus HerdCerd 20MB

I Q-500

Princeton MAX-12E

Quadram Mainlink IV W/ Softwere

\$ 629

\$ 725

\$ 399

\$ 99

\$ 649

\$ 439

\$ 149

\$ 229

\$ 499

\$ 779

\$1499

\$1750

\$ Call

\$ 789

\$ 369

\$ 375

\$ 519

\$1050

\$ 675

\$ Cell

\$ 169

\$ 549

\$ 749

\$ 999

\$1799

\$ 519

\$ 719

\$ 289

\$ 319

\$ 299

\$ 109

\$ 69

\$ 109

\$ 99

\$ 59

\$ 69

\$ 329

\$ 125

\$Call

\$ 119

529

Software	
Word Processing/	
Dasktop Publishing	
Byline	\$ 199
Microsoft Word	\$ 229
Multimate Adventage-II Lotus Manuscript	\$ 279 \$ 339
	\$ 249
Office Writer/Speller Pagemaker 3.0	\$ 569
PFS: Prof Write	\$ 119
Publisher's Type Founds	0 250
Vanture Publisher	\$ 519
Word Parfect 5.0	\$ 195
Wordstar Pro 5.0	\$ 199
Wordstar 2000 + 3.0	\$ 229
Xywrite III +	\$ 229
Database Systems	
Clipper	\$ 389
DBasa III Plus	\$ 389
Dete Perfect	\$ 269
DBase IV	\$Cell
Foxbese +	\$ 199
Paradox 2	\$ 429
PFS: Prof File	\$ 149
Q&A	\$ 209
R Base for DOS	\$ 479
RapidFile	\$ 199
Reflex	\$ 99
Omnis Quertz	\$ 469
Spreadsheats/	
Integrated Packages	
Javelin +	\$ 169
Lotus 1-2-3	\$ 309
Lotus Hal	\$ 49
Microsoft Excell	\$ 319
Microsoft Works	\$ 139
Plan Perfect	\$ 179
Quattro	\$ 129
Smart System SuperCalc 4	\$ 449
	\$ 289 \$ 495
Symphony	\$ 495
Communications Cerbon Copy +	\$ 119
Crosstalk XVI	\$ 99
Crosstalk MK 4	\$ 125
Ralay Gold	\$ 149
Smerterm (Persoft)	\$Cell
Smartcom III	\$ 149
Statistics	
SPSS/PC +	\$ 699
Statgraphics 2.6	\$ 479
Systat 4.0/	\$499
W/Graphics	\$649
Dasktop Environments	
MS Windows	\$ 89

Graphics		Hardware*	
Boeing Greph	\$ 219	Computers	
Chartmaster	\$ 219	AST Premium 286	\$ Cel
Design CAD	\$ 159	Semsung	\$ Cal
Diegraph	\$ 259	Sherp PC4502-A	\$1175
Diagram Master	\$ 199	Toshiba 3100/20 +	\$ Cal
Freelance Plus	\$ 329		e Cai
Harverd Grephics	\$ 279	Multitunction Boards	
MS Chart	\$ 269	AST Adventage	
PC Paintbrush Plus	\$ 89	Premium (512K)	\$ 309
Picture Perfect	\$ 199	AST 6 Pak Plus (64K)	\$ 129
Presentation Pek	\$ 349	AST Premium (256K)	\$ 219
Publishers Peintbrush	\$ 159	AST Rampage 286	\$ 419
Signmaster	\$ 139	Everex RAM 4000	\$ 299
Project Management		Inboerd 386AT	\$1050
Harvard Total		Inboerd 386 PC	\$ 750
Project Manager II	\$ 369	Intel AboveBoerd	\$ Call
Microsoft Project 4.0	\$ 329	Display Boards	
Superproject Plus	\$ 289	ATI EGA Wonder +	\$ 199
Timeline 3.0	\$ 349	Hercules Network	4 100
Languages/Utilitles		Card Plus W/Tops	\$ 349
Festback +	\$ 99	Peradise VGA Plus	\$ 259
Lettice C	\$ 229		4 200
Norton Advenced	\$ 79	Modems	
Microsoft C	\$ 299	Heyes 1200/1200B	\$ 299
Mace Utilities	\$ 65	Hayes 2400/2400B	\$ 449
MS Fortran 4.0	\$ 299	US Robotics 1200B	\$ 109
Quick Besic/Quick C	\$ 69	US Robotics 2400B	\$ 189
Turbo Basic/Turbo C	\$ 65	Ventel 2400/2400B	\$ 389
Turbo Pescal	\$ 65	Ventel 2400/2-PS2	\$ 299
Accounting		Networking	
AccPac BPI	\$ 279	Arcnet Board	\$ 149
Great Plains	\$ 499	Novell Adv. Netware 286	
Peachtree Comp II	\$ 159	Novell ELS	\$ 399

CO	DI	201	D A	TE	DI	IIV			•
CU	nı	וטי	пи	16	DI		=44	\mathbf{z}	
	4000								
Join over									

selected SOFTLINE as their primary vendor. Here's why. . Wide Selection-We carry over 1000 "corporate" titles. We

 Low Price Our motto has always been "Sample our Service nce shall never be an issue.

 Fast Delivary For those last minute rush orders, we offer convenient overnight delivery . P.O.'a. of Coursel! We accept purchase orders from

qualified organizations. Ask about our customized purchasing programs for volume buyers ATTENTION

INTERNATIONAL BUYERS!! We process export orders to thousands of companies worldwide Convenient TELEX and FAX facil Contact Fay Chayne, Intl. Sales Manager

Celebrating 5 Years of Excellence 1333 Alth Street Customer Service Hours: 9 AM-5 PM, Mon.-Fri In New York State call (718) 438-6057 Brooklyn, NY 11230-0010 TELEX 627-30170 or 910-240-3918 FREE SHIPPING on all orders over \$1,000,00. FAY /718: 438-2315

Dur Prefer: * All naturns require prior authorization * 20% Redocking the on returns * POs accepted from qualified organizations * Visu or Mastercharge—add 5% * COO, Cash M.O. or hank check only—add 55:00 per order * Prejud personal or company check—allow how weeks to clear * Snipping via UPS surface—add 55:00 per item. UPS Blue—add 5:10:00 per item * Prices subject to change, call for latest prices.

THE GENERIC SPEECH AND WHAT IT MEANS



All industry announcements are simple variations of the same hoary generic speech. This annotated sample will help you cut through the smoke screen.

s President and CEO of one of America's top software companies, I am delighted to be here this morning in support of a hard-ware announcement that we believe has tremendous significance for our industry." If If didn't show up, people would realize that the rumors about our financial condition are missing.

"This latest hardware breakthrough brings microcomputers a whole new level of price/performance." [Way too high.] "So we believe this is truly a product

"So we believe this is truly a product with dramatic potential." [There are actually a few ideas here somebody will probably clone.]
"The new line announced today repre-

sents a rich, robust platform for the future." [When the clones arrive and the price descends from the stratosphere.]

THIS LITTLE PIGGY "As I have said on many occasions, the question of total

system throughput is always uppermost in our minds." [With hot machines, even our programs don't look quite as piggy.] "So we forecast a strong migration path to these new units." [Our VP in charge of loanning did her undergraduate thesis on

the habits of lemmings.]

"And we're proud to be a part of what
we see as a new and exciting business opportunity." [If people are actually willing
to pay these prices for hardware, maybe
we can gouge them for our software, too.]

"This latest hardware advance sets a new industry standard—and I'm here to announce that it has our full support." [We'll start developing software products for the darned thing the instant they actually sell their first million units.]

THE LEADER'S BURDEN "As you know, industry leadership carries with it important responsibilities." [Seems as if I have to attend dull events like this every couple of days.]

"And as I'm sure you're all aware, we have prided ourselves from the outset in adhering to industry standards." [We were the first to copy the WordStar user inter-

"Our mission is simple: to design and market products built not just for today, but for tomorrow and for the twenty-first century." [When we may finally get all the bugs out.]

"Our goal is to enhance the rich feature set that has kept us at the forefront of industry leadership." [We've gotten rich by leaving our feature set alone until the competition forces us to improve it.]



"Productivity is the key to our future—and the user's." [A few users may have actually saved more time with our programs than they've wasted installing them, learning how to use them, and reconstructing their lost and corrupted files—though we wouldn't want to put money on it.]

"We believe we have gained our customers tens of thousands of productive hours." [Version 1.0 of our project-planning program included February 30.]

BRING ON THE HOOKS! "The question of connectivity is among our industry's greatest concerns—and one we strongly share." [That expensive network we bought still goes down every time somebody sneezes near a cable.]

"More than ever, our programs are designed to address tomorrow's workgroup needs." [Today, all our programs fully support Sneakernet.]
"As we have announced in the past, we

intend to be a major player in the worlds of SNA, SAA, OS/2, Unix, and Macintosh." [If our programmers ever finish tinkering with our DOS versions.]

"But we will never sacrifice our current level of DOS compatibility." [Our TSRs have always demanded to be loaded last, and even then they don't work with other companies' programs; we certainly don't intend to change that now.]

"We believe multitasking is the wave of the future." [A couple of our executives think it'd be neat to play games while they print out business plans.] "It will enable us to achieve new levels

■ STEPHEN MANES

of integration." [And new levels of programming heartburn.]

"We intend to fully explore advanced artificial intelligence techniques to help make the transition as painless as possi-

ble." [Our sales staff desperately needs brain transplants.]

"We believe that the coming wave of graphical interfaces offers a broad new window of opportunity." [One of these

days, we'll think about putting mouse support into our programs.]

"The desktop metaphor clearly represents one good solution—but not necessarily the only one." [We're definitely going to think twice before we let Apple sue us for picking up the trash.]

WORLDWIDE INNOVATION "We intend to be an integral part of daily business life—not just of the Fortune 500 and American corporations, but also of corpo-

■ "We have gained our customers thousands of productive hours." [Our project-planning program included February 30.]

rate decision makers throughout the world." [Now that we're falling behind our competitors at home, we're looking to markets where people haven't caucht on

our competitors at nome, we re rooking to markets where people haven't caught on yet.]

"As an industry leader, we have consistently lent our unqualified support to major hardware innovations." (We were the first

in the industry to announce our support for the Cauzin Soft-Strip System.] "When benefits are obvious, we rush to embrace them." [We were the first in the industry to announce our support for the RS-232 copy-protection lock.]

"And we are firmly committed to supporting our users on the upgrade path now and in years to come." [With the same busy signal they've come to know and love.]

"Today's announcement heralds a whole new era in personal computing." [If this thing really does catch on, we'll have to hire more programmers to convert all our old stuff.]

"Once again, we're proud to be a part of it." [Since they won't be shipping for months, what do we have to lose?]

"Thank you." [I just hope none of these reporters brings up that stock-option deal]

The United States Senate Used askSam To Manage Every Word Of The Iran-Contra Hearings.



When The United States Senate Select Committee compiled the volumes of testimony and evidence during the Iran-Contra hearings.

they used askSam to manage every word.

The system stored, searched for and quickly retrieved even the most obscure detail, text or numerical, with unparalleled speed and ease of use—without the crippling restrictions of the average database. It's this unique, versatile "free-form" design that makes askSam 5 version 4 the perfect system to manage all of

your information.

From sales leads to research notes, financial lists to videotape collections, askSam keeps all

your information at your fingertips.

Easy Entry, Swift Retrieval.

askSam includes the most advanced data

entry and retreival features available, like our full-screen text editor for easy addition of new records with or without formal definition of fields. Or you can use our ASCII-Import facility for importing word processing or database files

The Information Manager. askSam's full-featured system makes it versatile enough to handle any amount of

information for any particular need.

Power-users will appreciate innovative
numerical capabilities, report generators (up to
160 columns wide) and field manipulation as

Senside Software, Inc. to now askSem Systems askSem regain Copyright 1988, askSem Systems es

You Can Use askSam To Manage Your Information.



well as askSam's command language, security features and automatic phone dialer. If you're not a power user (yet) askSam offers extensive context sensitive, on-line help

oners extensive context sensitive, on-une ners servers whenever you need them— wherever you are.

askSam's Hypertext Facility.

With askSam's powerful hypertext facility.

you can easily create menus of askSam files, programs and much more. Money-Back Guarantee.

Moncy-Back Guarante
We'll give you 60 days to
see just what askSam can
do—and how it can
manage your valuable

information—for just \$295.
See Your Dealer Or Call
(800)-3-ASXSAM

(800)-3-ASKSAM In FL call (904) 584-6590

circle 471 ON READER SERVICE CARI

1986

1987

P.O. Box 1428, Perry, Florida 32347
newy 1994 PC XT, 4T, or compatible and 1994 PC X



EmulateThe Best WithThe Brightest.

There's no denying the availability of some outstanding dedicated terminals to access Digital, Hewlert-Packard, and Data General, host systems. Which makes the task of precisely emulating the performance of those dedicated terminals on an IBM*PC or compatible a rather significant challenge.

Based on the feedback we've received from Smarlerm® users, our family of terminal emulation software has met the challenge, passed every test, and surpassed, in the opinion of a host of enthusiastic users, the performance of the host system terminals being emulated.

The reasons why we shine are fundamental.

Every Smarlerm emulation is precise. So precise, in fact, that a dedicated terminal's Smarlerm counterpart fully emulates not only advanced performance

features but also unique terminal quirks and bugs.

Every Smarferm emulation is easy touse. It's one thing to make software do what hardware does. It's another challenge to minimize software's human wear. The people designing our products understand the nature of the people using them.

Every Smarlerm emulation is easy to learn. These days, training costs are a hot topic. Software intended to boost overall system efficiency must recognize the value

of learning speed. We have.

It's also easy to learn more about how SmarTerm emulations can help you shine. You software dealer can supply all the details. Or you can contact us at (608) 273-6000 to request complete specifications and a demonstration disk of the SmarTerm emulation that precisely matches your requirements.



When our custo our LAN, they do

It's easy to understand why our American-made 10 NET* has met with such rave reviews among the 100,000 PC users in the 40 countries where it's been introduced.

Perhaps it's so popular because it's so easy to install over twisted pair or even fiber-optic cable. Perhaps because it's compatible with NET BIOS and also offers communication to the mainframe with IRMALAN® products and CROSSTALK®

Perhaps because it's so surprisingly powerful with its easy-to-use software that offers excellent



ners talk about n't mince words.

Inc. at 1-800-358-1010. In Ohio, you can call us at 1-800-782-1010.



В

s

1

м

T S

What's black & white & read all over?

The new Mitsubishi*mp286L laptop personal computer.

Until now, thinking portable meant thinking compromise. In readability. Or speed. Or power. Or expandability. Or all of the above. But now the mp286L eliminates the compromises.

Its big, bright, black and white "page white" backlit 11" display is easy on the eyes. It's readable from several feet away. In virtually any light.

A powerful 80286 processor clocks in at 12MHz, and that's probably faster than the desktop computer you're now using.

The 20MB internal hard disk and options including a math co-processor, internal modern, extended memory, and numeric keypad, put to rest once and for all the popular notion that you can't take it with you.

With the mp286L, you can even move up to MS OS/2.

But best of all, you don't have to compromise quality: the mp286L is built like a Mitsubishi: built to work long and work hard.

The mp2861 is assembled in the U.S. for assured delivery and availability. Missubishi resellers are experienced specialists who provide systems support, training, and applications assistance you can count on.

Call toll-free: 1-800-556-1254 extension 25 (in California, 1-800-441-2345 extension 25) or write: Mitsubishi Electronics America, Inc., Computer Systems Division, 591 Knox Street, Torrance, CA 90502 for the authorized mp2861 reseller nearest you.

CA 90502 for the authorized mp.286L reseller hearest y
Because the best choice in a laptop computer
is right here in black and white.



65 OS/2 is a trademark of Microsoft Corporation. © 1988, Misubish! Electronics America, Inc.



Nous omputer-

...ABOUT ANALYZING YOUR DATA, You might be spreading your spreadsheet a little too thin. Or

maybe you're starting from scratch. But if you're serious about data analysis, you're ready for SPSS/PC+" - a full software family that brings you eight high-powered ways

to complete any data analysis task.

Enter it. SPSS Data Entry II" is a fully integrated data entry, cleaning and editing tool.

Analyze it. The SPSS/PC+ base package provides a powerful array of statistical and reporting procedures. Picture it. SPSS/PC+ Graph-in-the-Box* featuring New England Software's Graph-in-the-Box" offers full color

'snapshot" graphics. Examine it. SPSS/PC+ Advanced Statistics" lets you get more serious with your data. Predict it. SPSS/PC+ Trends"—our latest option—is the

complete time series analysis/forecasting tool. Table it. SPSS/PC+ Tables" produces presentation-

ready tables instantly.

Chart it. SPSS/PC+ Graphics" featuring Microsoft* Chart creates show-stopping graphs and charts.

Map it. SPSS/PC+ Mapping "featuring MAP-MASTER" creates maps where vast amounts of data can be summarized and presented in one, simple picture.

SPSS/PC+ products are being put to productive use by serious fact finders in business, government and education. For countless purposes such as market research. Wage and salary studies. Survey analysis. And quality control. Plus each product is superbly documented and supported by SPSS Inc., a leader in statistical software for nearly 20 years. While specially tailored customer support is available through the VALUE PLUS" plan. And SPSS now offers a SPSS/PC+ version for Novell LANs. So if you're serious about data analysis, step up to PSS/PC+. For details, contact our Marketing

CALL 1/312/329-3316

SPSS Inc. • 444 North Michigan Avenue, Suite 3000 • Chicago, Illinois 60611 In Europe: SPSS Europe BV. • PO. Box 115 • 4200 AC Gonnohern. The Neth

compatible microcomputers, SPSSPC+, SPSS Data Entry II, SPSSPC+ Graph-in-the-Box, SPSS PC+ Mapping are trademarks of SPSS Inc. WALLE PLUS is a trademark of SPSS Inc. Chart and Number Data is trademark of SPSS Inc. Chart and Number Data is a trademark of SPSS Inc. Chart and Number Data is a trademark of Nave Portained Software.

Department.

© 1967, SPSS Inc CIRCLE 139 ON READER SERVICE CARD

COMPAQ'S DESKPRO 386S

LESS IS MORE

With its new
16-bit 386
microprocessor,
the 386SX,
Intel is determined
to redefine
the midrange
of personal
computing.
Compaq's smallfootprint Deskpro
386S gets the
ball rolling.



heis written, Compa

the history of PCs is written, Computer Corp. will go down as the company that carried the sword for Intel's 80386 microprocessor. That fact will make Compag a hen, because the 386 is destined to move desktop computing from its current visible and productive position in corporate America to dominance of the information-processing business.

Compay's history as 386 hern is short and well known. It was the first Protect to bring you 80386 power, originally in the Deskpo 386, then later in the Deskpo 386, then later in the Deskpo 386, then later in the Deskpo 386, then compay has come up with more-innovative 386-based PCs. To almost nobody's surreprise, one of those is the long-turned Deskpon 386/25, powered by a 386 microprocessor running at a roker-like 25 MHz. That's 25 million processor cycles per second, in case you wern't sure.

Believe it or not, the 386/25 may be less

interesting to you than Compaq's other new 386 PC: the Deskpro 386S. The Deskpro 386S is exciting because it offers you both less and more computer than previous Deskpro 386 models.

In the less department, the Deskpro 386S is based on the new Intel 386SX microprocessor chip. The 386SX is not as powerful as ordinary 80386 processors in two dimensions. The current version of the chip is certified to run at a maximum clock speed of 16 MHz, which puts it near the bottom of the heap in the 386 speed race.

■ COMPAO DESKPRO 386S

The 386SX is also a lesser processor because, while it processes data in 32-bit chunks like any 386, it moves data into and out of itself in 16-bit chunks, which is half the input/output (I/O) bandwidth of standard 386 processors. This makes its I/O bandwidth equal to that of 8086 and 80286 processors.

LESS IS MORE. However, the 16-bit andwished the 48-68X processor is precisely where less becomes more for the Deskpro 386S. The new processor's in-put/output configuration allows Company to pack 386 processing power into as mail-er configuration and for less money than its standard 32-bit Deskpro 386 line. That pits he new computer not against high-end against middle-and gagainst middle-and 28-bit 28-bit 28-bit 38-bit 38-bit

Whatever cise you can say about FS2, and their Micro Channel architecture, the Model 50 is a reasonably popular deskips computer. That is not because of its performance; its 10-MHz 807266 processor and between the processor and because of the processor and because of the processor and could rame off the top of our heads. The Model 50 sells well because it has something that most business-applications users want even more than peak performance; a small footprint. You can plank a monitor on top and 101-leve Pathanced-monitor on top and 101-leve Pathanced-monit

[163716]			
	Compaq Deskpro 386S	IBM PS/2 Model 50	Deli System 220
RAM	1MB	1MB	1MB
Floppy disk drives	One 1.2MB 5 1/4-inch	One 1.44MB 3 1/2-inch	One 1,44MB 3 1/2-inch
Hard disk options	20MB, 40MB, 110MB	20MB	40MB, 100MB
Included software	DOS 3.31, CEMM disk caching	DOS 3.3	Multisoft disk caching
On-board video ada	pter VGA	VGA	VGA
Ports	One serial, one parallel, one mouse	One senal, one parallel	Two serial, one parallel
Slots	Five 16-bit	Four 16-bit	Three 16-bit
SPECIFICATIONS			
Clock speed	16 MHz	10 MHz	20 MHz
16-bit memory implementation	13MB through expansion slot	7MB through expansion slot	8MB on motherboard, 8MB through expansion slot
Math coprocessor	80387	80287	80287
RAM chips	Dynamic	Dynamic	Dynamic
OTHER			
Warranty	1 year	1 year	1 year

IBM

Compaq Deskpro 386S vs. IBM PS/2 Model 50

and Dell System 220: Summary of Features

ing to have to share your desktop with a PC, the Model 50 is just about the right size. So is the Deskpro 386S. The difference FACT FILE is that the Deskoro 386S delivers 16-MHz 386 performance and houses up to two Compaq Deskpro 386S 110MB hard disks. Which PC would you Compaq Computer Corp rather share your desktop with? I know my Houston, TX 77070 answer, but if you're unsure, read on. (800) 231-0900 List Price: \$3,799; with 20MB hard disk. \$4,499; with 40MB hard disk. \$5,199; 80387sx coprocessor, \$799. In Short: The Deskpro 386S is the first of a new breed of 386 machines based on Intel's

386SX processor, a 16-bit chip with 32-bit

functionality. Its high-end power coupled

with its attractive small-footprint design make it a machine with something to please AN UNFAIR ADVANTAGE Pitting the Deskryto 3865 in a performance race against the Model 50 almost isn't fair. The 286 processor in the Model 50 runs at a paulty 10 MHz with one memory wait state (the new Model 50Z has none); the 3865X processor in the Compagn runs at a snappy 16 MHz with no wait states. The PC Labs benchmark-test numbers seem all too

BIOS manufactures

FCC certification class B

style keyboard in front, and still have plen-

ty of room to do the rest of the things you

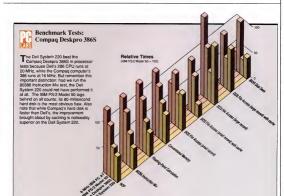
need to do on your desktop. If you're go-

Compaq

seconds to perform the 80286 Instruction Mix test; the Designo 3865 does that test in 4.55 seconds. Perhaps more important, the new Compaq can do the 80386 Instruction Mix benchmark test in 4.5 seconds. Perhaps a fairer comparison is the Floating-Point Calculation test; the Compaq chums through it in 17.36 seconds while the Model 50 takes 28.3 4 seconds.

Phoenia

The Model 50 is almost as well known for the poor performance of its 80-milli-second, 20MB hard disk as it is for its small footprint. The Deskgro 3665 will not disk as the property of the poor performance has adequate cipacity and performance into the timy, 31/-into its tacked under the cover of the men unist tacked under the cover of the men machine. You can get the Deskgro 3865 in standard models with 20MB or 40MB model and sidd an optional 110MB disk in model and sidd an optional 110MB disk in any case, you can add a second hard disk.



Performance Times

(Times given in seconds except w	NOP	80286 Instruction Mix	Floating- Point Calculation	Conven- tional Memory	DOS File Access (small record)		DOS	Access (large record) with cache	Disk Seek (milli- seconds)
8-MHz IBM PC AT	4.17	8.96	35.60	1.29	72.63	N/A	19.74	N/A	29.20
IBM PS/2 Model 50	3.35	7.20	28.34	1.05	95.95	52.17	12.77	12.41	79.64
Compaq Deskpro 386S	2.08	4.56	17.36	0.77	62.76	39.24	7.34	7.34	25.00
Dell System 220	1.68	2.96	12.91	0.58	68.08	13.24	14.56	10.29	31.97

N'A-Not applicable the 8 MHz 16M PC AT is unable to perform these tests with caching

The NOP benchmark test is designed to measure revided speed and memory access time white minimizing differences in microprocessions and the effect of memory caching. This test executes emost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The 80286 Instruction Mit benchmerk test measures the time it takes to execute a selected sense of processor intensive tests. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

The Floating-Point Celoulation benchmark test measures processor speed by looping brough a sense of floating-point calculations, including multiplication, division, exponentiation, and logarithms and topomentic functions. The benchmark program uses the floating-point binary included with Microsoft C Compiler 4.0.

The Conventioned Memory benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Their, 16,364 readon records are read into and written from this memory. The result shown is the everage of the read and written from the memory.

The DOS File Access benchmark test measures the throughput near of the dais, being lessed, in this case, throughput these are measured in terms of how long the disk takes to perform common DOS file management functions. Fire ISSA—The creation, sequential file write, separated file regul, readom file write, serviced and the regulations of the regulations.

The text is carried out for two different types of Neo-smallrecord files and large-record files—that are used by combon PC applications. Files created using small records eltypically used by disablese menagement programs, and largerecords ele spically used for word processing and spreadquest files Loading e DOS program is also smillisted by the large-accord feet. If no disk caching softwere is supplied by the computer or disk drive manufacturer, each test is run once. Otherwise, the seat for each record size is run heicer once with the caching software installed and once without it.

DOS File BIOS

The BIOS Olek Seek benchmark test measures the time it takes to do a random seek using the dek's RIOM (IOS). The lest result includes minime software overhead and may not parallel the menufacturer's claimed everage access time. The sitest program performs 1,000 seeks. The everage result is shown in militaconds.

All disks are ESDI units, and all but the 20MB have data laid out with a 1:1 inter-leave to speed up performance. The two smaller hard disks are rated at 29-ms. access times, while the 110MB unit runs at a rated 25 ms.

The unit 1 tested had the 40MB disk, and it ran the PC Labs BIOS Disk Seek test

and it nn the PC Labs BIOS Disk Seek test in 25 ms., which indicates that Compaq's engineers have rated the access time conservatively. It nat the PC Labs DOS File Access (small ercord) test in 62-76 seconds in standalone mode, and at 39-24 seconds with the Compaq-supplied disk-eaching software installed. That's about one-third faster than the Model 50.

Speed is only one aspect of the Deskpro 386S's performance, and for many of you, it's not the important one, or at least it soon won't be. The other side of the Deskpro 386S's performance advantage comes from the capabilities of its Intel 386SX processor and the perceptive engineering that Compaq's designers have built into the computer.

Because it's a 386, the new Deskpro can run anything any other 80386-based machine can run: the 386SX processor's 16-bit I/O bandwidth has no impact on that wonderful fact. You can use Microsoft Windows/386 to multitask your DOS applications, or, if you'd rather, use DESOview. PC-MOS, or VM/386 to do your DOS application multitasking. Some of you might enjoy giving Unix a whirl, and several versions for the 386 are at your beck and call on this machine. Programs written using DOS extenders, such as Paradox/386 and FoxBase Plus/386, can run as DOS applications in protected mode on the Deskpro 386S, just as they do on any 386-based PC.

THE OS2 EDGE Perhaps more important to your PC future, the Deskpro 386S is a better OS2 machine than the Model 50—by a lot. Though the new Model 50Z has a better, 30MB hard disk, Compaq still has the upper hand.

Part of the Deskpro 386S's OS/2 advantage comes from its 16-MHz speed, although that won't be too important to OS/2 users until the bit-mapped Presentation Manager shows up. Another part of its OS/2 advantage comes from its larger, fleeter hard disk(s). That's apparent even

THE LITTLE CHIP THAT COULD

Intel's P9 chip means that you'll never buy a 286 machine again. With the 386SX, you get most every benefit of a full-blown 80386 for only \$100 more than a 286—eventually.

Do yourself and your company a fayou. Don't ever buy a 286 now that you can get a P9. Forward-looking PC gurus jumped ship on 8088/8086 platforms 2 years ago. Now's the time to follow suit with the 286.

PS was the code name for Intel's longumored poor man's 80386—a 32-bit chip designed to work in AT-class machines, using a 16-bit data path instead of the 32-bit data path of a full-bero 386. The PS chip was formally named the 366SX at its June 20 announcement (P numbers designate Intel internal designs; the PS evolved into the 80386.

As Intel ramps up production, the difference between a 386SX-class machine and a comparable 286 from the same maker should fall to \$100 or \$200. That won't be until early 1989. Right now, 386SX chips are scarce; Intel is the sole source, and we all know about the laws of supply and demand. In quantities of 100, Intel's 12-MHz 286, 16-MHz 386SX, and 16-MHz 80386 chips cost \$137, \$220, and \$299, respectively. Compaq, a premium-quality, premiumprice vendor charges roughly \$500 more for its new Deskpro 386S-the first machine to use the 386SX chip-than for its 12-MHz Deskpro 286.

Why is the 286 in eclipse? Compare the 386SX to the 80286:

ine 366x A to the 80/266:

Be Existing DOS applications. On clock ticks alone, the 16-MHz 386SX is 10 to 33 percent faster than 8 - to 12-MHz 286s. The PC Labs benchmark tests show that the Compap Deskpto 386S beats the 80286-based Model 50 by 35 to 40 percent.) The performance difference is even greater than the CPU speed difference because the 386SX executes instructions more efficiently than the 286.

just as a 286 is more powerful than an 8088 by a margin greater than the simple difference between 8 and 4.77 MHz. Advantage: 3865X.

Multitasking this year. Microsoft Windows/386 and VM/386 let you load and run multiple DOS programs, but only if you have an 80386. Advantage:

■ Power applications this year. A handful of important programs bypassed the 286 with 80386 DOS extenders: Para-

■ 386SX-based machines are the right choice for the cost-conscious

midrange of PC users.

dav386, Q&A/386, interleaf's Technical Publishing Software. Advantage: 386SX.

- Multitasking in 1989. Both 286 and 386 chips run OS/2 and OS/2 Presenta-
- 386 chips run OS/2 and OS/2 Presentation Manager. Advantage: Draw.
 ■ Multitasking in 1990. A 386-only
- version of OS2 (likely to be called OS2-386 or OS82 2.0) is due in late 1989 or 1990. An operating system that doesn't have to deal with the quirks of the 286 (inelegant switching between real and protected mode) affords more-powerful, smarter application programs. Some copole suspect OS2-386 will be the version of OS2 that really matters. In the copy, at least, the 3865X under OS2 or OS2-386 would run programs 3 to 5 times a fast as a similar program would

under DOS. Advantage: 386SX.

■ Cost. Of the components contained in a PC, only the 3865% system unit and the faster RAM chips cost more than their 286 counterparts. The hard disk, floppy disks, video can't, monitor, tape backup, printer, software, mouse, floppy disks, and training all cost the same. Advantage: 286 by a whisker on cost, 3865X on bang for the back.

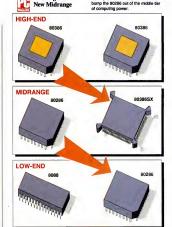
Poised to run DOS applications for the next several years (Bill Gates believes OS/2 won't eclipse DOS until 1991), the 3863X-based machines are the right choice for the cost-conscious midrange of PC users. They'll support LIM 4.0 without separate expanded memory boards; they're ready whether OS/2 or OS/2-386 rejens thereafter.

Compagave the 386SX a big boost by designing a small footprint for the 386S, recognizing the scarcity of desk space. Video, memory, and I/O don't steal slots, and the four free slots armore than enough for the vast majority of users. The 386SX also makes a superb after-hours machine for the hour high after-hours machine for the hour high.

Every serious PC vendor is dying to bring out a 386SX machine. Right now, chip supply is the constraining factor. Natural candidates for 386SX variants are offshoots of IBM's Model 50 and Dell Computer's System 220—along with the other three dozen makers of small-footprint 286 and 386 machines.

Don't Jettison your existing 286 systems; just don't draw up future purchase orders for anything south of a 386SX PC. Once chip prices settle down, you can expect to see a PP accelerator for existing AT-class machines—comprising the 386SX and several support chips—for under \$500. Then your 286 will have a future, after all—Bill Howard.

Bill Howard is an executive editor of PC Magazine.



When prices stabilize, the 80386SX will

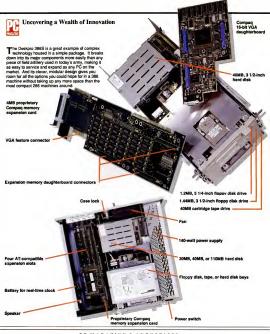
Defining the

While the 80388 chip will continue to dominate the high end, the shifting of 386 power into the midrange and the resulting shift of 286 power into the low end will spell doom for the 8088.

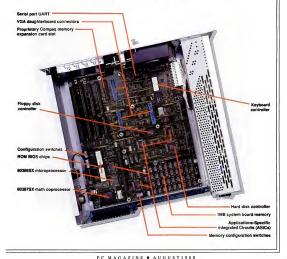
The 80386SX microprocessor is software compatible with the 80386 Chip,but as prices drop, it will compete directly with the 80286. Shoppers in the midrange, forced to decide between a 286 machine at \$1,500 and a 386SX machine at only a few hundred dollars more, will flock to the new chip to take adventage of its bargain-priced 386 capabilities.

The result: prices for 288 machines will continue to tumble, pushing the machines below \$1,000 and making them direct competitors to the XTcompatibles that currently bring up the rear.

■ COMPAQ DESKPRO 386S



The Delevino 3865 system until breaks down into the basic box and there mayor subassemeloles. The system board's compet (in a 366 marchine) see is largely due to use of surface mount sechnology and compete) heavy relatione on ASICs designed sepecifically included a special integration of the second section of the second section of the cludders a special integration control for a 15 cludent or 5 14 cludent of hoppy dates, a super diver, or a second hard disk. The second subassements of a Compat (15 th Vid. Adequates control and one mounts file against the system board. The VSA feature connector is mounted in the top of dummy board it experience of the system board. The VSA feature connector is mounted in a feature of the system board of the system board of the system board of the system board of the dummy board it experience of the system board of the system board of the system board or as the system board of th



"The ALR 20MHz FlexCache 20386 proves that you don't have to be based in Texas to build the world's fastest PCs."

1988



In July of '86 Logic Research was the world's first manufacturer to release an 80386 based PC, adding to a long

list of California firsts. Today at ALR, we manufacture the world's fastest PCs. Industry peers have recognized the FlexCache 386 series as the ultimate NOVELL tool for the most

demanding business applications in network, multi-user and CAD/CAM environments. "The ALR FlexCache 20386 will make a name for itself as a heavy-duty file server. ...the FlexCache is destined for success."



The ALR FlexCache 20386 Model 150 achieved a rating of 19.7 in Byte Lab. "Tops in price and performance



Resource June, 1988



" Well, for once the answer isn't to run right out and get your hands on a Compaq Deskpro 386/20.~ Rather, it's to get your hands on an ALR FlexCache 20386."

> First Looks March 15, 1988



" ... the FlexCache 20386 yields the highest number of MIPS (million instructions per second) per dollar."





Redefining PC Speed

Although we can't go any further west, ALR is claiming new frontiers in PC performance and processing speeds. Now, fast is even faster. The ALR FlexCache 25386 breaks every current speed record. Our proprietary 64Kbyte Extended Emulation 82385 ~is the key to 25386 Cache speed.

Models	20386DT-R66	20386-150	8570-121	25386-150	8570-A21
Microprocessor	80386 20MHz 32K8, 82385 Memory Coche (35ns)	80386 20MHz 32K8, 82385 Memory Coche (35ns)	80386 20MHz 0-2 woit-	80386 25MHz 64K8 Extended Emulation 82385 Memory Coche (25ns)	80386 25MHz 64K8 Memory Cache (30ns)
Bench Mork	4,71 Mips	4.71 Mips	3.53 Mips	6.09 Mips	5.74 Mips
Optional Math CoProcessor	80387 20MHz	80387 20MHz	80387 20MHz	80387 25MHz	80387 25MHz
Memory (RAM)	1M8 (80ns)	2M8 (80ns)	2M8 (85ns)	2M8 (60ns)	2M8 (80ns)
Storoge 1 2M8.5 1/4" FD 1 44M8.3 1/2" FD	1 Optional (\$225.00)	! Optional (\$225.00)	Not Available	1 Optional (\$225.00)	Not Available
Fixed Disk stall Opt Internal Full Height Fixed Disk	66M8 (28ms) 66M8 or 100M8	150MB (18ms) 150MB or 300MB	120MB (23ms) No Support	150MB (18ms) 150MB or 300MB	120MB (23ms) No Support
Video	Optional IA bit VGA	Optional IA byt VGA	VGA	16 bit VGA	VGA

FlexCoche

18M PS/2

70 386

18M PS/2

\$11,295.00

FlexCoche

\$9499.00°

\$4590.00* \$7490,00° \$7995.00

slow in Texas...

Now that things are get'n kind a

PC performance is redefined.

.go West young man. Call ALR for the world's fastest PCs, under the California Sun.

1-800-444-4ALR

Advanced Logic Research, Inc. 9401 Jeronimo, Irvine, CA 92718 Phone: 714-581-6770 FAX: 714-581-9240 Telex: 510-601-4525 Answer back Advanced Logic

CIRCLE 493 ON READER SERVICE CARD ver Corp. (C)Convent 1988 Advanced Load Research Inc. now, because most of you chew up 20MB of hard disk faster than herakfast cereal while running DOS. OS/2 system software and the applications that run under OS/2 all take more space than the equivalent DOS software. For the Model 50, the GS/2 Presentation Manage will make the disk-epacity problem more sacue because its file and files for the applications that run under it) will add to the already hethy chunk of sonce used un by OS/2.

More advantages are found in the Deskpro 386S's RAM design. Make no mistake; running OS/2 applications will take lots of memory. Despite what IBM and Microsoft like to say about 2MB being enough to run OS/2, that doesn't include running applications; each OS/2 application you run concurrently will call for about IMB of RAM when it loads. Therefore, if you run four applications you will need 4MB of RAM on top of the 2MB you need just to start up OS/2, or 6MB altogether. IBM's optional memory products for the PS/2 line will not let old Model 50s reach that kind of RAM level (though the new Model 507 can take 2MB of 85-nanosecond RAM on its system board). While installing third-party memory cards will solve the problem, that requires using up the precious few expansion slots that the Model 50 has.

Compaq has a better idea. Like all Deskpros, including the original 8086-based model, the 3868 uses the company's concurrent bus design, which keeps when every running at full processor speed while peripherals run at 8 MHz on an AT-opatible system I/O bus. The Deskpro 3865 cross equipped with a standard 1010-0ns. RAM on the system motherboard and Compage Expanded Memory Management (CEMM) software to let you use all off it for DOS applications.

You can expand that to 13MB, without using any of the Deskpor 38KS is four AT-compatible 16-bit slots, if you install one of two versions of the company's proprietary memory card. Either the 1MB or 4MB card can be expanded in 1MB or 4MB increments using optional daughterboards. The maximum-option card is the 4MB model with two 4MB daughterboards hume noto it.

When you use Compaq's proprietary memory card, the system uses a paging

SECRETS OF A CHIP'S SUCCESS

The arrival of the 386SX processor is reminiscent of other times when improving CPU performance while maintaining bus standards was a winning combination.

Then IBM introduced the PC in 1981, it drew a lot of flack from futurists who maligned its choice of Intel's 8088 CPU. Critics claimed that the otherwise powerful chip, running at 4.77 MHz and capable of processing data 16 bits at a time, was hindered by the width of its external data bus. All communication with the outside world was forced to take place in 8-bit chunks. Transfers of 16-bit data had to be split into two parts and moved separately. slowing transfer rates. The arguments were hot and heavy as to whether the 8088 was even a real 16-bit CPU or simply an enhanced 8-bit CPU. But the decision to use the 8088 was based on sound engineering principles: reduction in the design and in the manufacturing costs and ensuring parts availability. The dominant processors in micro-

recomputers of the day were 8-bit devices like the 8080 and the 280. The technology for producing 8-bit perhaps widespread and well established. IBM's decision to use a well-documented design, open architecture, and an easily exploitable 8-bit data bus allowed a rapid migration of existing hardware to the infeat PC and sided its exchanges excess.

fant PC and aided its explosive success. In 1984, IBM introduced the PC AT. It sported the Intel 80286 CPU (lumbering along at a now leisurely 6 MHz) and a brand-new bus standard that extended the external data path to a full 16-bit width. Although the 80286 was designed to implement a "protection mode" and provided some rudimentary hardware support for multitasking, the computing community wisely ignored this feature and ran the machine simply as a fast PC. Clone manufacturers jumped on the AT bandwagon and began producing workalikes in droves. Clock speeds soared as high as 16 MHz, and the number of 16-bit peripherals grew. The AT

became the minimum acceptable hardware platform for serious computing.

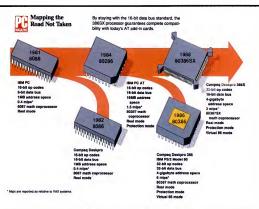
THE NEXT SIEP Then, amid great afmare and speculation, Intel amnounced its next-generation microprocessor: the 80386—at true 52-bit CPU designed to use a 32-bit external data path. IBM, fearing for the viability of its minicomputer lines, declined to introduce an 80386-based machine, and Compaq seized the opportunity. But no IBM stammar of the season of the season

With legendary conservativism. Compay simply avoided the decision by building its 80386 computer with ATstandard 16-bit accessory slots and a proprietary 32-bit memory slot. The CPU and system memory ran at a blazing 16 MHz while the peripherals continued to run at 6 to 8 MHz. Thus was born the first of many hybrid "386 ATs," combining the best of the old and the new.

Following Compaq's tead, many other close manufactures redesigned their at 18 years to accommodate the 80386. To address RAM using a 32-bit mace betted on path, more printed circuit traces had to be etched onto the already crowded multi-layer circuit board. And the higher CPU speeds aggravated electromagnetic reference problems. Worse yet, computer ference problems. Worse yet, computer purchasers were confused. Every manufacturer developed its own 32-bit memory extension.

WELCOME TO THE 386 WORLD

But now, a wonderful thing has happened. The long-rumored P9 chip has been announced by Intel as the 3865X. Fully equivalent to the 32-bit 80386 CPU in processing power, instruction set, and virtual-mode support, the chip deviates



from its big brother by one small detail: it's designed to operate with a 16-bit external data bus. Just like the 8088 before it, the 386SX can be used as the foundation for a microcomputer design that produces some clear advantages for buyers.

The 3865X-based systems can be produced inexpensively. A computer system is more than just the CPU, and the 3865X uses the standard 16-bit data and memory path, making the design requirements of the system board very similar to those of a fast AT board. Expect instant compatibility with every peripheral and expansion and you own. Board and expansion and you own. Board of all, eliminate all thought of whose 32-bit standard to adopt.

The 386SX isn't a direct replacement for the 80286. Dedicated hardware now performs the same functions that were once executed as microcode subroutines. This means that a 386SX, running at the same clock speed as an 80286, will run

the same software faster.

And unlike the 80.286, the 80.286, so the 80.286 s. SSS x contains handware support for aimmating mithigle 8086-type CPUs in a single chip. When coperating under a WM-386, the chip makes possible full multitasking of the DOS applications you already own. The programs act as if they were each numling on a separate, dedicated of 60K 8086. The cash you'll say not having to replace all your application no mornically unleashed by companies.

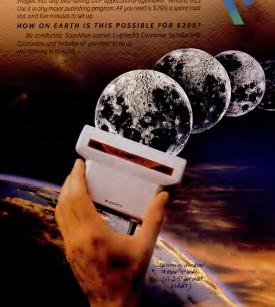
mically unfeasible by comparison. Like the 80386, the 386SX can run in 32-bit native mode; this places the computing power of a mainframe at your fingertips. Special 32-bit versions of FOR-

TRAN and COBOL compilers allow previously unthinkable applications to be run easily and quickly. Enhanced versions of popular PC programs, rewritten to use 32-bit instructions, will run up to five times faster.

The 386SX will allow manufacturers to fuffil their promises of delivering inexpensive 80386 computing power for the common man and will also provide an easy upgrade path for today's 80286 machines. If you think you can't afford an 80386, just wait.—Robert L. Hummed

Robert L. Hummel is senior technical editor of PC Magazine.







Exp Date

Offer valid in the U.S. only. Allow 2-3 weeks for delivery, 30-day Money Back Guarantee. DEALER INQUIRIES WELCOME Sand to: LOCATECH line, attrictions Program, 6505 Kaser Drive. Premant CA 94555 CIRCLE 182 ON READER SERVICE CARD

ScanMan

LOGITECH

Cord Number

Cardholder Name.

City/State/Zip_

Authorized Signature

■ COMPAO DESKPRO 386S

scheme to interleave memory and achieve zero-wait-state memory-access speed. This allows fetches within a 2K memory page to be done without inserting processor wait states. That's the same memory system Compagues on the Deskpro 386 and the Portable 386. The Deskpro 386 and the Portable 386. The Deskpro 386/20 and 58672 we a static RAM cache to achieve higher memory speeds. (For a full achieve higher memory speeds.)

If you want, you can use standard expansion slots to add memory by insight of pansion slots to add memory by insight or ordinary hird-party (1-bit memory cards in them. That option can be used to expend RAM beyond 13MB, or you can install as smark ind of cards for memory levels fower than that. Using standard memory cards will cost you some performance by dobiling memory access times—only for the memory installed on those cards—emory installed ing operations to the 8-MHz speed of the system's 1/D bas.

In all cases, you can use CEMM software to access the memory as LIM 4.0 expanded memory. Thus, your Lotus 1-2-3 spreadsheet—and any other applications that take advantage of LIM memory—can use that option on the Deskpro 386S.

FIRST IMPRESSIONS DON'T COUNT All these features come in a small package that at first looks more like a low-cost. small-footprint AT clone than any Deskpro you've seen from Compaq before. Closer examination reveals the high-quality industrial design of the new case, and the Deskpro 386S quickly shows itself to be a close design relative to the Portable III and Portable 386. Compaq's design objective for the externals of the Deskpro 386S required that the machine-with keyboard sitting in front-fit on a secretary's Lshaped return. (A return is typically 18 inches deep, just big enough to hold an IBM Selectric typewriter.)

Well, a compromise or two had to be made, but the Deskpro 386S just manages, and it also fits—more comfortably—onto an executive credenza, another parking spot Compag had in mind for the unit. In fact, the fit on an L-return is so tight that if yours has a vertical rail sticking up at the back, the new 386S may not fit because the



The back of the Deskpro 386S shows Compaq's only concession to PS/2 design: the coinoperated cover fasteners and the PS/2compatible keyboard and mouse connectors.



Compaq's compact design includes a "flip-up" hard disk mount whose single Torx screw secures the house single deaves room for an extra floppy disk and tape drive in from.

cables sticking out of the bottom can jam up against the rail and cause the keyboard to stick out over the front edge.

The most obvious design compromise is in the keyboard. The 386S keyboard looks like a standard Compaq 101-style keyboard that has been sliced off on top. That makes the keyboard-and-PC combination shallow enough to fit on the L. but leaves you no room for keyboard templates designed for the horizontal-format function keys of the keyboard. Evaluating keyboard feel is always controversial-at least around the editorial offices of PC Magazine-but it's clear that Compaq has shifted its keyboards away from their former "mushboard" feel. The new ones have a "clickier" feel, although the keytops seem wobbly under your fingers.

Every other compromise required by the small footprint of the Deskpro 386S gave Compaq's designers and engineers a

chance to show their stuff. They wound up packing a large pile of machinery and chips into a very small place, neatly and effectively, and it shows everywhere from the system's layout to the compact arrangement of chips on the all-surfacemounted mother hand

Probably the cleverest of those decisions is the disk drive layout. The front of the Deskpro 3866 gives you access to three one-third-height device slots, one of which is always host to a 1.2MB 50-inch floppy disk drive. The other two are for options. Just behind those slots is where the miniscule 314-inch primary hard disk resides, mounted on a hinge-like frame that leaves it resting between the rails of the other devices slots.

You have to give up one of those device slots for a hard disk only if you opt to install a second one. The extra device slots can also be occupied by a Compaq-supplied 1.44MB 31/2-inch disk drive or backup tape unit. In all cases, the disk controllers are housed on the system's motherboard and don't occurv an I/O slot. Tape units come in 135MB DC 600XTD format or 40MB DC 2000 format. If you go for the 40MB or 110MB drives, do yourself a favor and get one of these backup drives to go with it. Naturally, you can also install any device that will fit (and, by the way, a full-length card will just squeeze into each slot inside this compact chassis)

The Deskpro 3865's designen decided to make Compasy's commitment to VGA permanent in this PC, and the engineers put the required controller and memory chips on the system's motherboart. The three process of the system's motherboard the three prices and memory board, or on a special board if extra memory has not been insalled. The VGA is the same 16-bit, high-speed unit we've reviewed proviously (see "The Fastest Risk Around," PC Magazine, January 36, 1980), and it mus the PC adaptates and the state of the s

The system board can optionally house an Intel 80387SX math coprocessor. Unlike its full-scale 386 brethren, the Deskpro 386S does not support the Weitek 1167 coprocessor, but engineers and scientists are not the target market for this machine, so that is not much of a deficit.

The software Their diversity is remarkable; their loyalty, intense. Every behind the Every day, the list grows longer. Every day, the accolades pour in. hard copy.

From publishers, writers, lawyers, managers, technicians—and especially software reviewers— XyWrite III Plus is universally

acclaimed as the preeminent word processor available today. Listen to the praise:

"Crisp. Powerful. In a class by itself."

"Customer support is friendly, forthright, patient."

"Every document in (PC Magazine) is edited using the fastest, most powerful word processor on the market: XyWrite III Plus."

"A fine flexible tool; it lives up to its promotion and reviews."

"XyWrite III Plus is perfection."

Feature-laden. Flexible. Powerful and responsive. Discover for yourself why so many publications, corporations, and professional writers depend on XyWrite III Plus.

For more information or the name of a dealer near you, write: XYQUEST, Inc., 44 Manning Rood, Billerica MA 01821. XyWrite. Or call 617-671-0888. For people who write.



COMPAQ DESKPRO 386S

Also on the system board are serial and parallel ports, and, not surprisingly (or should I say at last?), a mouse connector compatible with IBM's PS2 mouse port. Running down the side of the cabinet, to the right of the disk drives, is the 140-watt power supply. That should be more than enough to support the limited number of options you would need to install in the Deskpro 386S.

The net of all this is a fully powered 386 PC in a compact package with four standard 16-bit expansion slots at your disposal. And given what comes as standard equipment on this machine, four slots should be more than enough.

At least, it should be more than enough for the general business user at whom Compaq is aiming this machine and, for that matter, at whom IBM has successfully aimed the Model 50. You might need a local area network card, and possibly a 3270 card for connecting to a mainframe if your

LAN doesn't have a gateway. Maybe you'll want to connect a CD-ROM drive or voice-messaging unit to your machine, and that will take a slot. But that makes three, maybe four slots. If you need more than that, you're probably a better fit for the description of a Deskpro 386/20 or 386/25 user.

OTHER CHOICES The Deskpro 3863's economical 386 processing power makes in one of the best deskpo computers ever built, and a fine alternative to the Model 50. But it isn't the only Model 50 alternative that's come our way lately. First of all, there are any number of highperformance, small-footprint AT-compatible clones on the market that will due a fine

desktop-computing job for many of you.
Besides the Deskpro 386S, the strongest contender for Model 50 business is
Dell Computer Corp.'s tiny new System
220. Based on the fiery 20-MHz 80286

chip manufactured by Harris Corp., the Dell System 220 is actually a faster computer than the Deskpro 386S, as measured by several PC Labs benchmark tests, also less expensive (\$2,699 with a 40MB hard disk and VGA monitor) and includes many of the same options, such as built-in VGA, disk, and peripheral support on the system motherboard.

Call me a 386 biger if you will, but I land I me a 386 biger if you will, but I land plant you have been 20 is only faster, not more powerful, than the Desk-por 3865, and in of the processing advantages that any 386 has over any 286 pre-vail. If having processing power for the nineties means more to you than sheet processing speed for today, then spend a little more for the Deskpro 3865, the best Model of 260 alternative in town.

John Dickinson is the director of PC Labs at PC Magazine.

Facing

your facts?

As the operator of a small business you are constantly being challenged to respond quickly. Easy and efficient access to your financial data is often critical to the success of your operation.

Bedford Integrated Accounting

has been designed to let you face your financial facts quickly. Through fully integrated general ledger, receivables, payables, payroll, inventory and jobcosting, your records are as current as the latest entry.

With Bedford, financial reports are available immediately on your computer screen. No more nustling through stacks of paper for details of that transaction, or waiting days, sometimes weeks to see your financial position. You get the facts you need when you need them. Simply and comfortably.

If you find you're not able to respond as quickly as you would like, drop by your nearest Bedford dealer. They'll show you some facts about our \$249 software we're sure you'll have no problem facing.

making software comfortable™

bedford.



CIRCLE 492 ON READER SERVICE CARD

Bedford Software Corporation • 15311 N.E. 90th Street • Redmond, WA 98052 • (206) 883-0074



We've got a whole new family of tape backup systems.

Whether you've got an IBM, a compatible, or a Macintosh, you can count on Tallerass. We back you with all the storage capacity you could ask for, plus all the features, all the support, and all the speed you'll ever need. And we make it easy to protect your valuable data. Since all operations are automatic

and unattended, you can just set it, and forget it.

Best of all, we stand behind our products with the industry's only 3-year warranty.

But there's one other reason why so

TALLGRASS TECHNOLOGIES many more people are asking for Tallerass. It's because the competition is asking so much more for their products.

CIRCLE 233 ON READER SERVICE CARD

Let Tallgrass start backing you up. Call 1-800-TAL-GRAS. Or write to: Tallerass Technologies, Inc. 11100 West 82nd St Overland Park, KS 66214

When it's worth saving, it's worth Tallgrass

The Dell System 220. Once again the critics stole the words right out of our mouth.

"the Dell machine is renewed evidence that the price of 286-based desktop equipment continues to drop rapidly, making such machines very attractive for daily work under MS-DOS even as they hold out the promise of running OS/2 in the future."

-WILL ASTIE FO WEEK

"...includes a year's on-site support...in the price of the computer. This is the sweetest support deal offered by any computer very in industry."

-ENCKNORR FO WORLD

"The hot item from a technical point of view is the System 220. This machine runs a 286 processor at 20 MHz, which is its major claim to fame."

"the System 220 has more going for it than just speed."



The reviews are beginning to pour in. And they read like a wish list for every power user looking to exceed the ordinary limitations of a 286 computer.

The computer everyone is praising in such glowing terms is the Dell System 220.

The first 286 computer with a clock speed of 20 MHz.

It's totally MS-DOS® and MS®OS/2 compatible. Yet it sells for much less than you may pay for a 386 computer.

Because you buy it direct from us. Eliminating the mark-ups and mar-

gins of computer stores.

We design and build every Dell computer right here in Austin, Texas.

We put each and every one through a comprehensive burn-in and a battery of diagnostic tests before we ship it.

And after we ship, we give you the best technical support you'll find anywhere in the computer industry.

Our technicians are on the phone from 7AM to 7PM every business day.

Almost any question you may have about a Dell system can be answered over the phone.

And, in the rare case, that your guestion can't be answered by an on-line technician, we'll send a Honeywell Bull technician by the next business day.

A full year of on-site Honeywell Bull service is included within the purchase price of your Dell system.

Your Dell computer also comes with a thirty-day money back guarantee.

And we back every one of our computers with a one year limited warranty on any defective parts or workmanship. For more information about Dell

computers, read the reviews in the trade press, turn the page, review our product offerings, and call us at (800) 426-5150.

You'll like what we have to say



The Dell Computer

Welcome to our store. We believe you'll find this an extremely

pleasant shopping experience.

Our sales staff is on hand to serve you from 7AM to 7PM (CST) from Monday thru Friday.

fust call (800)426-5150 and we'll give you the technical assistance and information you need to make sure you're buying the system that's right for your needs.

Then you have the option of either a direct purchase or your company can take

advantage of our Leasing Plan*

Once you've made your choice, our Total Satisfaction Guarantee gives you thirty days from the day you receive your system. to decide if you are absolutely totally satisfied with the product.

If you're not, simply return the system and you'll receive a full refund. No questions asked.

Your Dell computer is supported by a team of technical experts that can be reached every business day, from 7AM to 7PM (CST), simply by calling (800) 624-9896.

In most cases, any question you may have about your Dell system can be answered by one of our technicians on the phone.

Our technicians are also supported by Honeywell Bull service engineers who can be sent to your office by the next business day. should on-site service be required.

This optional service contract is available in over 95% of the United States, with over 1,000 engineers in 198 service locations. We also offer a One Year Limited War-

ranty, which warrants each system we manufacture to be free of defects in materials and workmanship for one full year. During that period we will repair or replace any defective products properly returned to our factory.

Feel free to call or write for the complete terms of our Honeywell Bull Service Contract, Guarantee and Warranty Dell Computer Corporation, 9505 Arboretum Blvd., Austin, Texas 78759-7299

Dell products are available on GSA contract. Call us to get GSA pricing.

THE NEW 20 MHz 386

The top of the line. It's our highest performance computer available, faster than the IBM†PS/2† Model 80 and the Compaq 7386/20. It runs at 20 MHz with the latest 32bit architecture. Since it also has Intel's Advanced 82385 Cache Memory Controller, and high performance disk drives, the System 310 is ideal for intensive database management, complex spreadsheet development, CAD/CAM, desktop publishing or performance as a network file server

Standard Features: ■ Intel† 80386 microprocesso

- running at 20 MHz ■ I MB of 80 ns 32-bit RAM expandable to 16 MB without
- using an expansion slot. Advanced Intel 82385 Memory Controller with 32 KB of high speed static RAM
- Socket for 20 MHz 80387 coprocessor
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive Dual diskette and hard disk
- drive controller. Enhanced 101-key keyboard 1 parallel and 2 serial ports
- 200-watt power supply 8 expansion slots. Options:
- ■1 MB RAM uperade kit 20 MHz Intel 80387 math
- controcessor ■2 MB or 8 MB memory expansion boards "Lease for as low as \$148 Month."

Hard Disk

Dewes

40 MR

28 ms

90 MB

15 ma

150 MB

122 MB

THE NEW 20 MHz 286

As fast as most 386 computers at less than half the price-more power for the money than any other system. An 80286 system that runs at 20 MHz, with less than one wait state. Completely compatible for both MS-DOS® and MS* OS/2 applications (it runs faster than IBM PS/2 Model 80), and with a remarkably small footprint, the System 220 is the ideal executive workstation The system uses page mode inter leaved memory resulting in a

- performance increase of about 15 percent Standard Features: ■80286 microprocessor running
- at 20 MHz ■1 MB of RAM expandable to 16 MB (8 MB on system board).
- Integrated diskette and VGA video controller on system
- One 3.5" 144 MB diskette drive. Integrated high performance hard disk interface on system
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports. LIM 4.0 support for memory over 1 MB
- Real-time clock ■Three full-sized AT† compatible
- expansion slots Socket for 80287 coprocessor.
- Options: 3.5" 1.44 MB diskette drive. ■ Intel 80287 coprocessor ■1 MB RAM upgrade kit.
- *Leave for as low as \$85/Month With Monitor & Adapter VGA VGA Color Color Mono Plus VGA VGA 54,099 54299 54399 Mono One Duketu 54,899 \$5,199 \$5099 52,299 \$2,499 \$2,599



\$5,399 \$5600

\$7,399 \$7,599 \$2,699

\$5,599



\$3,799 \$3,999 \$4,099

\$3,299

A great value in a full-featured AT compatible. An 80286 compute running at 12.5 MHz, this computer is completely MS-DOS and MS OS/2 compatible. The System 200 offers high speed drive options, industry standard compatible BIOS and on-site service. As Executive Computing said of this computer's predecessor, "If faster processing speed and low cost are two key issues affecting your purchase decisi this machine might be the ideal choice for your office."

Standard Features: Intel 80286 microprocessor run-

- ning at 12.5 MHz.
- 640 KB of RAM expandable to 16 MB (4.6 MB on system board). 5.25" 1.2 MB or 3.5" 1.44 MB
- diskette drive. Dual diskette and hard disk
- drive controller. Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports. ■ 200 watt power supply
- · Real-time clock. 6 expansion slots. (4 available
- with hard disk drive controller and video adaptor installed). Socket for 8 MHz 80287
- coprocessor. Options:
- 512 KB RAM upgrade kit. 8 MHz Intel 80287 coprocessor. *Lease for as low as \$78/Month.

System 200	With Monstor & Adapter			
Hard Disk Drive	Mono	VGA Mono	VGA Color	VGA Color Plus
20 MB	\$2,099	\$2,299	\$2,499	\$2,599
40 MB ~ 40 ma*	\$2,299	\$2,499	\$2,699	\$2,795
40 MB - 28 ms	\$2,499	\$2,699	\$2,899	\$2,999
90 MB - 18 ms ESDI	\$3,299	\$3,499	\$3,699	\$3,799
150 MB - 18 ms ESDI	\$3,799	\$3,999	\$4,199	\$4,299
322 MB - 18 ms	\$5,799	\$5,999	\$6,199	\$6,299

A Full Line Of Computers With A Full Line Of Configurations.

At Dell, we understand that different users have different needs. So we tailor each system to the user's individual requirements.

We offer monitors, graphics boards, tape backups, dot matrix and laser printers, hard disk and diskette drives, expanded memory boards, serial mice and more.

We also offer third party software applications for virtually

every business application including: accounting, communications, desktop publishing, graphics, word processing, integrated applications and user training.

So when your Dell System arrives, you can do productive work the minute you unpack the box.

We can build you the system you've been looking for.

COMMON TO THE SYSTEM 310, SYSTEM 220 AND SYSTEM 200:

The Dell System Analyzer, MS-DOS and OS/2 compatible. Security lock with locking chassis. 12 month on-site service contract (Available on complete systems).

PRINTERS/SOFTWARE. We offer a full-line of printers and popular software. All printers come with our 30-day money-back guarantee and one year warranty.

LASER PRINTERS.

LASER SYSTEM 150: \$5,995. 15 pages per minute, text and full-page graphics. and full-page graphics. Dual 250 sheet-input travs.

LASER SYSTEM 80: \$3,295. 8 pages per minute, text

LASER SYSTEM 60: \$2.195. 6 pages per minute, text

DOT MATRIX PRINTERS.

PRINTER SYSTEM 800-PRINTER SYSTEM 600: \$699.95 \$49995

Highest resolution text and 9-wire dot matrix. graphics from a 24-wire dot Draft quality at 240 cps. matrix printer. Near-letter quality at 60 cps. Draft quality at 200 cps. Standard parallel interface. Correspondence quality Wide carriage.

at 132 cps. Letter quality at 66 cps. Standard parallel and serial

interfaces. Wide carriage. and full-page graphics.

PRINTER SYSTEM 300: \$19995

9-wire dot matrix. Draft quality at 144 cps Near-letter quality at 36 cps. Four standard fonts. Paper parking.

Standard parallel interface.

AD CODE NO.11B17

SOFTWARE. Operating System Software. Dell Enhanced MS-DOS 3.3 with disk cache and other utilities: \$119.95. Dell Enhanced MS OS/2 Standard Edition 1.0 \$324.95.



age without notice. Please inquire for current details. Dell cannot be rest

MS® and MS-DOS® are owned by Microsoft Corp. †Signifies registered or unregistered trademarks owned by entities other than Dell Corporation. *Payments based on a 36-month open-end lease. Please inquire for further details. © 1988 DELL COMPUTER CORPORATION CIRCLE 536 ON READER SERVICE CARD

errors in typography or photography In Canada, leasing is not currently available and configurations and prices may vary M



Cut yourself a better deal.

Buy MICRO CADAM CORNERSTONE" R. 1.3, send us your obsolete PC CAD software, and get a \$1,000* check from CADAM!

If you've always wanted real mainframe-based CAD power for your IBM® PS/2," PC/XT® or compatible system, here's a sharp new offer from CADAM.®

Buy new MICRO CADAM CORNERSTONE R. 1.3 now. Compare its productivity, ease of use, and mainframebased features with your conventional PC CAD system. (You can go right to work with your existing CAD files, thanks to MICRO CADAM CORNERSTONE'S new DXF data translator.)

Then cut up your obsolete software and send us the half with the label, along with your completed releate coupon and proof of purchase for MiCRO CAINAM CORNERSTONE R. 1.3. We'll cut you a check for \$1.000.

CADAM's rebate offer is the ultimate deal on the "ultimate PC CAD production tool." But act fast. Rebate expires October 31, 1988. See your dealer today for qualification details and rebate coupon. For the location of your nearest dealer, phone CADAM toll-free today: 800-255-5710.

MICRO CADAM CORNERSTONE . . . The Ultimate PC CAD Production Tool



HIGH-END CADD

EXPANDING TO NEW DIMENSIONS

Increasingly sophisticated CADD packages and lower-priced hardware that will run them have put professional drafting power in the hands of more and more PC users. PC Labs evaluates 12 CADD moreket leaders.

ADD use is spreading. That computer-aided design and drafting systems costing \$100,000 or more persear" only \$9 years ago can now be assembled for well under \$5,000 is no longer new. What is newsworthy is that inexpensive PC-CADD systems (the two D's stand for design and drafting) can now mean anything that VAX: and HP-based systems have to offer, including screen terms have to offer, including screen can data security and data security.

And what happened to the prices? When the cost of the hardware dropped precipitously, it increased the potential number of CADD purchasers, making it possible for software developers to amover before. With AusoCAD, Austocks, the industry leaders, see the price of a high-end PC-based CADD software package at \$3.00, and others have cather followed differently, emphasizing the contradistinction.

When systems in the \$100-to-\$300 range came out, many of the vendors with \$3,000 systems realized that they needed to offer products priced over a wider range. Autodesk brought out AutoSkerch, for \$80. VersaCAD Corp. adopted Evolution Computing's Easy CAD as its low-end system, but later dropped it because it that tracted VersaCAD prospects. Caddey released Cadkey 1. These extremely inexpensive products have been a boon to new CADD users—and a thorn in the side of the established vendors.

Many of the large CADD system wentors—Computervision, Intergraph, Cadum, Auto-trol, and their like—lawe intuduced PC CADD products, but his becoming more difficult for either users or vendors to differentiate between laws of small systems. Integraph's MicroStation, for example, spots a superset of the graph's popular VAX-based IGIDs. Computervision's Personal Designer was the firm's CADDS 45 product.

Data transfer has greatly improved in recent years. It is now common to create drawings on a PC CADD system or transmit them to larger CADD systems and to other PC CADD units. Both IGEs, an ANSI-standard format, and DXF, a format created and then placed in the public domain by Autocesk, are used. So universal

has DXF become that several paint and graphics programs now save files to it.

AUTOMATED DRAFTING Today's CADD systems automate drafting, and do it well. Oddly, they do not usually increase the productivity of a drafter in the creation of a drawing; instead, their benefits become apparent during the drawing modification phase.

Once the drawing geometry and associated information are stored in digital form, they are easy to change. Changes in scale and orientation are particularly easy to make, but text and dimensions are also easy to add and alter.

There are dozens of PC CADD programs on the market today, ranging from \$44,95 to \$10,000 and more, but you don't always get what you pay for. In general, the lower-cost systems are better buys; many \$300 programs offer 70 percent of the capabilities of \$3,000 programs.

For production drafting, however, the difference in cost is usually justified. While all CAD systems enable the user to draw geometry and place text, the more expensive systems offer many different ways to constrain geometric elements as they are drawn, hence it is not unonnot to have eight ways to draw a line and five ways to draw a circle. Such common to have eight ways to draw a circle. Such common creasing draftine productivity.

Similarly, higher-end programs have sophisticated text handling and links to popular database management systems. These features differentiate between true production tools and less-powerful sketching programs.

Real user programming languages are generally found only in the expensive systems. However, function-key programming and menu customization appear in many inexpensive products.

EQUIPMENT You don't need a 386 machine for two-dimensional CADD—but it certainly helps and is highly recommended. Your system should also include a large, high-resolution monitor. After all, if you're going to buy \$3,000 worth of software, shouldn't you maximize your hardware to use it? A math coprocessor chip is essential; even though many pro-

grams will run without one, they will be very slow.

Of course, a full load of memory—at least 640K—is a requirement for all systems. Some can take advantage of additional memory.

For input, most programs support a mouse or a digitizing tablet. Studies by the United States Army and Air Force indicate that neither tool is inherently superior to the other, choice of input device is simply a matter of personal preference. Many programs have both tablet menus and onscreen menus, as well as keyboard equiva-

OUR REVIEWERS

Caroline Halliday, an electrical engineering consultant with High Tech Aid, specializes in technical document on an eaching for the PC environment. W. Bradley Holtz is the founder of WBH Associates in Bethesda, Margland. He is a registered architect, Auffering consulting services in CADD systems, seaming, and management, and he is a frequent speaker at industry seminars and workshopes.

Donald C. Peckham is the resident engineer for Hyster Co.'s Berea, Kentucky, manufacturing facility. He is coauthor, along with Martin L. Ramsay, of product reviews that have appeared in several computer publications.

Jeff Prosles, a mechanical engineer, is a contributing editor of PC Magazine. Joe N. Orr, a CADDICAM and computer graphics consultant, holds a Ph.D. in mathematics and computer science. He is claimsan of Orr Associates Inc., located in Great Falls, Vitand the president of the National Computer Graphics Association and director of the CADDICAM Institute, a seminar and publishing firm. Martin L. Ramsay is the founder and

general manager of CEATH Co., a Berea, Kentucky, firm specializing in information design and software review. Will Schleter is a Knoxville, Tennesseebased mechanical engineer who provides software and operations support for a mainframe CADD/CAM system. lents for all commands.

lents for all commands.

Automatic input for systems of any size has yet to become truly workable. There are about a dozen systems on the market purporting to allow scanning, vectorization, text recognition, and database creation. However, all of these systems trule to the control of the co

Most automatic-digitizing-system vendors are tending toward retention of the input in raster form, with editing features for dealing with the raster data. Some systems, such as ProCadd, support combined raster/vector data structures, and this seems to be an emerging trend.

The number of graphics boards and displays available today is overwhelming. EGA resolution is the minimal requirment for CADD, but VGA or the emerging 851 standard (1,024 by 788) is preferable (though IBM's 8314/4 monitor and card will add about \$3,000 to the price of up-our system). Seren size is another important factor, most users feel that a 13tin-b serenia is to small. "The bigges the better" appears to be the consensus. Many programs support dual screens.

Graphics boards with on-board memory and processors can increase performance dramatically on any system—if they are supported by the software. Boards such as the Pixelworks Clipper and the products of Number Nine Computer Corp. can offer a tenfold improvement in screen repaint time.

Color displays are now standard for CADD. Indeed, most CADD products rely on color to enable the user to differentiate among items on the screen. It is possible to use monochrome displays in a production CADD facility, but there are very few users who prefer black and white over color.

OUTPUT It's a buyer's market for output devices. Hewlett-Packard, CalComp, and Houston Instrument are the leaders in pen plotters; all offer 25-inch-per-second or faster plotters for drawings up to D size (22 by 34 inches) for less than \$5,000. And many smaller companies will sell you a D-size pen plotter for less than half that



Beyond Flat Drawings: A World of Possibilities

Drawings are two-dimensional: they have only length and width—mo depth. Physical objects are three-dimensional: even flat objects, like sheet-metal stampings, have a thickness. In a computer, a disa structure that stores the geometric coordinates (r and ly) of the endpoints of lines, the centers of circles, and the origins of text blocks can be fairly simple and yet can fully represent the important features of a Crawton.

The simplest of these data structures for object representation is the 3-D wireframe. Objects are represented by their edges, which are considered to be lines in space and asstored as pairs of triplet coordinates (x, y, z). While more verbose than a 2-D wireframe, e 3-D wireframe data structure is only slightly more difficult to implement.

3-D wireframe images, however, are of little use for most applications. Such views of physical objects are very confusing; volume and surface area cannot be measured, and standerd fabricating operations, such as drilling and welding, cannot be adequately represented.

By adding a representation of the physical object's surfaces to the model, we gain the ability to measure the object's surface area and volume, as well as represent standard machining operations. Furthermore, using surface-based systems makes it possible to generate mappes in which the edges normally hidden from the user's

view remain unseen.

Surface-based modeling systems are an extension of
the wirefreme; they enable the user to define surfaces thet
span the edges of the models. The most advanced of
these systems ofter a wide variety of surface-generation
techniques, making it possible to create complex surfaces.

But surface-based models are difficult to construct. And they do not automatically dose faces that are cut was they do not automatically dose faces that are cut yet sectioning or other modifications. So if you construct an object and with to enhance it by edding openings and protrusions, you must explicitly define each surface—an unnatural, often tectious, process. Moreover, this approach does not prevent you from constructing shapes—such as visual paradoxes—that could not exist in reality.

Solid-modeling systems overcome the problems of surfaces, but et a price. They consume extensive compute resources and limit the complexity of the surfaces that can be used to bound a solid object. Nevertheless, for certain classes of design problems, solids can be very effective, even on PCs. Only solids make automatic interference checking possible.

Why the restrictions on the types of surfaces that can bound solids? Because the complexity of the curves occurring at the intersection of arbitrary surfaces can easily be too great for almost any computer to handle, let alone a

Thus, although construction proceeds much faster with sold models than with surfeces, not all complex shapes can be correctly represented in today's solid-modeling systems. In particular, shapes that cannot be easily described by mathematical equations are not covered in these models.

Right now, most CADD systems are used only for drawing—even if they are capable of generating models. To apply 3-D modeling to mechanical design, much more research and education is needed.

3-D WIREFRAME



A 3-D wireframe drawing, like this piano design, is best used as a visualization tool. Many CAD packages offer this function, and those that go no further are finding themselves increasingly outpaced by the competition.

SURFACE-BASED



Hidden-line removel is the first step toward solid modeling. By removing the lines that would not be seen if the object were solid, a truor 3-D representation is echieved. At this stege, however, the plano is still not a

.

SOLID MODELING



A solid-modeling package paints the surface of the object and offers shadowing capability. Smart solid synthesizers can locate the center of gravity and determine other physical properties of the object. (Images supplied by Cadkey.) amount, though it will be slower (see "Pen Pushers: Plotters Go to Work," PC Magazine, December 22, 1987).

The larger plotters have multiple pens, plot buffers, plot optimization, and many other productivity features. Most use the Hewlett-Packard HPGL plot format; Calcomp and other formats are available but less popular.

Electrostatic plotter vendors are also making a bid for the small user's business. Versatec, a subsidiary of Xerox and the leading vendor of these devices, recently announced an electrostatic plotter shaped like a pen plotter, for \$20,000. With prices expected to fall over the next 2 years, these machines may give high-end pen plotters a run for their money. Electrostatic plotters are raster printers that use xerography to deposit parallel rows of dots (at 200 to 500 per inch) on special coated paper, at speeds of I to 2 running inches per second-about 50 times as fast as pen plotters. Thus they can output a D-size drawing in 20 seconds or less-in almost complete silence. Color units are available, but they are very ex-

pensive. The drawback of electrostatic and other raster devices is that they need computer power, or time, for converting CADD files into raster format. The cost of a hardware RIP (raster image processor) can add several thousand dollars to the price of the CADD system, but the lack of one can eliminate the speed advantage of an electrostatic plotter over a pen plotter.

Impact printer/plotters, such as the JDL 850 EWS (33,495 with HPGL support, \$2,495 without), are gaining in popularity. At the present time, these particular output devices are limited to C-size drawings, but they do offer color.

Laser printers are growing in popularity as CADD output devices, although most are limited to A-size drawings. Their ease of use and 300-dot-per-inch resolution make them attractive to many users. Larger-format laser printers at plotter prices are at least a year away.

small-format (A-size and B-size) color output is presently dominated by thermal and ink jet plotters, which range in cost from \$1,200 for the HP PaintLet and \$4,000 for the CalComp PlotMaster to \$100,000 and more for the 72-inch-wide Microdynamics ink jet plotter. As realistic

color-shaded images become more popular, these devices will gain in importance—and drop in price.

NETWORKS All the popular PC networks can handle CADD files. For central data storage and management, there are special programs like CSI's CAD-Central that offer file security, configuration management, and other important features, for heterosencous systems.

CADD ON THE MAC The Apple Macintosh now has a number of effective CADD programs: Powerdraw, Architrion, MGMStation, Minicad, VersaCAD, Pegasys, Snapl, and others. They are, as a rule, less expensive than DOS CADD software packages. The priclest is VersaCAD, as \$1,995—but with site licensing, the cost for multiple seats drops quickly. Most of the others range from \$500 to \$1,500.

Most of the Mac CADD systems support IGES or DXF, but only VersaCAD has full direct file-read compatibility among its Mac, PC, and workstation products.

The Macintosh SE is adequate for drafting tasks with programs that use integer coordinates, like Powerdraw 3-D programs, and those with floating-point coordinates, really need the power of the 68020-based Macintosh II, which comes with a math coprocessor.

SELECTING A SYSTEM A functional system specification, based on the requirements of your applications, will help you determine which CADD systems you need, but there are other important considerations that will narrow the field.

Is there a system that most of the practitioners in your field use? For example, many architects use AuoCAD or Data-CAD, and many mechanical engineers of Cadkey. Do not automatically select or reject a system for its popularity among your colleagues, but ty to determine whether that popularity is the result of superior performance or superior marketine.

Some designers and drafters with no CADD experience may express a preference or a dislike for a particular type of input device. Most engineering professionals seem to prefer an input device that looks and feels like a pencil or pen. Al-

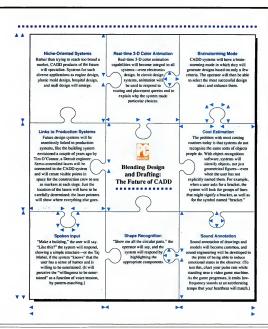
............

In tomorrow's CADD systems, further blending of design and drafting is likely to occur even though true 5-D has been slow to catch on so far. Design and manufacturing considerations will be introduced into the design process by artificial intelligence "agents"—programs that observe the process as it is taking place and offer suggestions for improvement.

From the coalescence of many new eatures will emerge a totally new activity quite different from what today is called drafting or even design. This new activity will take advantage of the resource available in graphical computers for the production of geometry with associated meaning-not just lines, circles, ellipses and splines, but walls, chairs, flanges, resistors, and roads. Instead of dea with mere geometric abstraction, CADD systems will understand the full semantic implications of nouns and verbs, and the user will be free to address the real issues of design-those having to do with form and function

These new systems will serve as symbiotes, not just mind amplifiers. They will allow users to do things that would have been impossible otherwise, and their use will become essential.—Joel N. Orr

.....



though studies do indicate that all the common input devices, including digitizing tablets and pucks, joysticks, trackballs, and other non-penlike units, are comparable in terms of case of learning and case of use, this is an area in which feelings run strong and prejudice abounds.

Most first-time users of CADD should get the entire system from a single vendor. Although money can be saved by mixing and matching, the resultant configuration is the sole responsibility of the buyer. Calls for help when it doesn't work will invariably lead to finger pointing, as each vendor denies any blame for the malfunction.

denies any biame for the manufactors.

Compatibility with other systems within the organization, or with those of clients or vendors, is another very important issue since file conversions—even those involving the neutral IGES file standard—can be inconvenient.

TESTING. Appropriate tests for CADD systems are not easy to design. FO systems are not easy to design. The results show relative speed, but case used to file size of a standard test pattern. The results show relative speed, but case addition, for this roundup, our reviewers were assigned three drawings—a gear, are for plan, and a 3-D image—and are saked to draw them as best they could use the standard pectual pectual processing the capabilities of the individual pectual perturbative pert

One good way to help gauge the quality of a system is to conduct in-depth interviews with users. Speaking to system users and managers helps you gain an appreciation of what the system is like—not what the vendor promises it will be like "real soon now." Be prepared to spend time helf a day or a day) with each of several users. This is an investment that always pays off.

IMPLEMENTATION Before attempting to automate your engineering or drafting process, analyze it closely and simplify it as much as possible. CADD productivity benefits favor the prepared user.

And plan to invest in training. A study conducted by Autodesk and confirmed by other researchers shows that self-trained users learn the software as quickly as those with classroom training—but the classroom-trained people continue to increase their productivity long after the selftrained users have reached a olateau.

HOW WE CHOSE THE SYSTEMS. There is a glut of CADD software on the market today. Close examination reveals only minor differences among the kading packages, despite considerable price differences. The challenges of engineering drawing, as implicit in centrale-sold engineering practices, have been mere under any lines, circles, rectangles, and or any lines, circles, rectangles, and proposed of the control of t

fast as we could ever do by hand.

The next step is to do more than we did
before: to expand the scope of engineering
drawing far beyond its original usage.

We selected 12 of the leading "fullsize" PC CADD systems that run under DOS on the PC (with the exception of Arris, which operates in the Xenix environment). Some are 2-D, some are 21/2-D, and a few come with 3-D modeline modules All are at the high end of performance and price. (Sixteen low-cost CADD contenders were reviewed in "Upwardly Mobile CADD," PC Magazine, December 8, 1987.) Unfortunately, at least two important new high-end products. April 5000 PC and 3-D FastCAD, were not ready in time for us to include them here. The following 12 reviews appear in alphabetical order by product name. - Joel N. Orr

Arris

Sigma Design's Arris has an ancestry dating back to the mid-1970s, when if first began as a tumkey CAD system based on 8-bit systems. As the product evolved into CAD Solutions, and later into Arris, it matured—growing into the system it is today and meeting the ever-growing demands of its architect user base on an "as requested" basis all alone the way.

XENIX COMPLICATION Arris is the only package reviewed here that operates under the Xenix environment. Installing it yourself may be hopelessly complex unless you already have SCO Xenix installed



on your system. The installation process could take anywhere from 3 to 6 hours, depending on your system. This includes preparing the hard disk for a large bootable Xenix partition, installing Xenix, installing the various modules of Arris, and configuring Arris.

of buildings. Also runs on Sun 3/series

workstations. Copy protected.

If you are not familiar with Xenix, this is the wrong place to start learning. The portion of the documentation on the installation process is quite good, but the process is so long and involved that it is easy to stray from it and end up in trouble. Let your dealer do it for you.

your dealer do it for you.

Once you get up and running, you'll see Arris's recently designed on-screen menu system. This menu structure is easy to learn and understand; it also makes possible a great deal of immediate control. Arris's ancestors were all command and tablet driven, and all the commands are

\$299 For 3-D CAD you can't bea by spending thousands more.







You can spend thousands of dollars for three dimensional CAD software and still not get the power and capability that DesignCAD 3-D

offers for a remarkable \$299! DesignCAD 3-D is proof positive that you don't have to spend a fortune for quality.

DesignCAD 3-D allows you to develop and advance any design in 3 dimensional space, while providing you with features such as shading, hidden line removal, printer and plotter support. DesignCAD 3-D's extensive file transfer utilities allow you to: transfer documents to and from IGES, DXF HPGL, transfer to GEM and Post Script and to read ASCII text files and X, Y, Z coordinate files. It allows up to 4 simultaneous views (any angle or perspective) on the screen. Complex extrusions, extensive 3-D text capabilities, auto dimensioning and a host of other features are all included with

DesignCAD 3-D, all at no extra charge.

DESIGNCAD 3.D

The compatibility that DesignCAD 3-D offers you means that it can be used with almost any PC compatible system. It supports

more than 200 dot matrix printers, more than 80 plotters and most digitizers and graphic adapters. DesignCAD 3-D can read drawings from most other CAD systems.

The best reason to buy DesignCAD 3-D is not the low price, the performance or the compatibility. The best reason is the amazing ease of use. DesignCAD 3-D's powerful commands mean that you can produce professional 3-D drawings in less time than you thought possible. In fact, we think you'll agree that DesignCAD 3-D is easier to learn and easier to use than any 3-D CAD system for IBM PC, at any price!

PC Resource Magazine has listed DesignCAD 3-D as one of the six new computer products worth watching in 1988.

Telex 9102400302



As an architectural design tool, Artis is hard to beat. Here, a two-dimensional floor plan is extruded into the third dimension, windows are added, and angled dimension lines give the measurements. On the floor by the front door, the real area indicates stone.

While zooming in on a corner of the floor plan, you can consult a menu for wall size and style to specify the type of wall you want to build.

still available within Arris. Unfortunately, they are totally undocumented unless you get SIGMAC (the \$1,000 user programing language) along with Arris. Sigma Design has held back for fear of intimidating new users, but with this program should do whatever you can to take advantage of its flexibility. Knowing about all the commands is a good way to start.

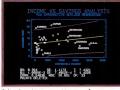
The system makes extensive use of function keys to choose a point F1 snaps to the Find selection, F10 snaps to the nearest endopaint, F5 snaps to the nearest endopaint, F5 snaps to the nearest line, and so on. Because Arris operates under Xensix, it also has multitassking and plot and perform any task in background mode except graphics. Depending on the system configuration, you can run several morganityines seems simultaneously, but when the properties of t

COMMAND LEVELS All Arris commands are given one of three levels of priorly. Creation and editing commands are at the upper level; setup, mode, and modifier manipulations are at the middle level; and display functions are at the lowest levil. This gives you the ability to set and select items before or after you pick a function. Most other systems have only two

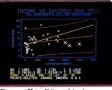
priority levels for interruptible commands. Arri also has a very compact database that differs from those of most other CAD systems. It stores entities by points and type rather than vice versa. A line is stored in the database as two separate point entities and a vector joining them. If one of those points is ensend, the line disuppears. The same thing goes for circles—if the window you are earsing contains of the points used to construct that entity, the entity disuppears.

The creation of lines and circles is a straighfloward process, and most construction tools are available using the Construction tools are available using the Construction Techniques selection or Horne the use of Find, which acts as a smp filter a Freeze turns: circles into polygons with a specified number of sides to be insorble in into the existing circle upto 10 (100) this currently necessary to Freeze circles in cirde to find intersections involving circles and ares, but there is no Unfreeze command the circle exists only as a series of

STATGRAPHICS



Select the points you want to remove from your regression model...



... Then press F6 to refit the model and recalculate the statistics.

Because "Statistical Graphics" Is Better Than Just Statistics and Graphics

Most of today's PC statistical packages give you all the statistics you you all the statistics you'll ever need. Some even give you a few graphics. But only STATGAPHICS from STSC gives you integrated statistical graphics in an environment you control.

Unique "What II" Interactivity
STATGRAPHICS lets you explore
data relationships fully,

data relationships fully, producing higher quality, more timely solutions. Define your data and assumptions, run the procedure and review the results, modify data and assumptions repeatedly and take another look—and another. All without leaving the procedure or making permanent changes to your data.

Integrated Statistical Graphics

Coupled with STATGRAPHICS' Interactive environment are over 50 types of graphs — traditional ple and bar charts, histograms, 30 line and surface plots, qualify control charts, and more. All are Integrated with the procedures so that they can be displayed instantly and modified receatedly.

Query data points, do on-screen forecasting and model fitting, overlay graphs, or zoom-in on any area for a closer look. With flexibility like that, you can spot and investigate visual trends in your data—trends you may have missed if you looked only at the numbers.

Over 250 Statistical Procedures

- Direct Lotus[®] and dBASE[®] Interfaces
- ANOVA and regression analysis
 Experimental design
- Quality control procedures
- Multivariate techniques
- Nonparametric methods
 Exploratory data analysis
- Forecasting, time series analysis, and more.

STATGRAPHICS— The Best Way to Do Statistical

Put the power of STATGRAPHICS to work for you today—all for only \$895*. For our free convincer kit or the name of a dealer near you, call

(800) 592-0050 ext. 200 In Maryland, (301) 984-5123;

Internationally, (301) 984-5412. Telex 898085 STSC ROVE





A wide variety of grephs supported on over 100 displays, printers and piotters, including the new iBM PS/2™ Series.

STSC STSC, Inc. 215 East Jefferson Street Rockville, Maryland 20852

ouggested retail price in U.S. and Canada. International prices very. Available through dealers and distributors worldwide. STATORAPHICS, Lotus, and dBASE are registed trademarks of Statistical Graphica Corporation, Lotus Development Corporation, and Ashbon-Tests, respectively.

The monitor that makes obsolescence obsolete.



MultiSync II

The world's best-selling color monitor, compatible with all leading graphics standards. At NEC, we design our products with a simple principle in mind.

What works well today should work just as well tomorrow.

And the MultiSync® II is no exception. It's a monitor that has proven itself compatible with all the leading computer systems.

Including the PC/XT/AT/386 (and their 100% compatibles), PS/2 and Mac II. As well as all the leading graphics boards. So as technology continues to evolve you can be confident that the MultiSync II will be ready to meet the challenge.

The MultiSync II has an advanced ergonomic design that makes computing more comfortable. With a smaller footprint, upfront user controls, tilt-swivel base and a non-glare screen.

Best of all, it's from NEC. The company that not only invented the technology, but that also insures that your investment in it doesn't become obsolete. For literature or a dealer call 1-800-447-4700. For technical details call NEC Home Electronics (USA) Inc. 1-800-NEC-SOFT.







Speaking of CADD: An Illustrated Glossary of CADD Terminology

AEC Architecture/engineering

Aliasing A term that comes from signal processing, a subdiscipline of electrical engineering. Used in graphics, aliasing refers to "jaggies"—the stairlike steps that make up a diagonal line on a raster display. Some displays incorporate "anti-aliasing" circuitry, which reduces the visual impact of the jaggies without increasing resolution.

Associative dimensioning The process whereby a program changes some dimensions automatically to reflect changes the user has made to a dimensioned object.

Attributes Features of a rendering under user control. They can be graphical, such as color, line type, and so forth, or nongraphical, such as part number

Begier curve A kind of smooth curve defined by four points, two of which are the endpoints. The other two do not lie on the 2. line of the curve but attract it during interactive tracking, so that 3the shape of the curve is influenced by their location but retains a natural smoothness. Bezier curves are often used to design consumer products such as automobiles fenders and other smooth objects.

Boolean equations Applications of the set-the-A-B=C ory operations of union, intersection, and complement to solid models.

Break To make gaps in a geon object, usually creating new endpoints; for example, removing an arc from a circle.

B-spline A mathematical representation for smooth curves. Compare Bezier curve.

CADD Computer-aided design and drafting.

CAM Computer-aided manufac-

turing, including numerical control (NC), robotics, and other applications of computers in the factory.

Chamfer To join or chop two perpendicular lines with another line.

Coordinate precision In digital computers, points in space are represented by discrete numbers. The coordinate precision is a measure of how many such points can be distinguished in a given unit of area. Sometimes precision is expressed as a linear function, as in "100 points per linear inch." Another way of specifying coordinate precision is in programming terms, as a numeric type: 16-hit integer means that each axis can be divided into 65,536 parts (2 to the 16th power); floating point means that each axis can be divided into a very large number of parts. There are various forms of floating-point representation, all of which can express values of 100 million or larger

The coordinate precision of a CADD program is what determines whether you can represent small objects that are found within large areas. For example, in a 16-bit integer system, if a plot of land that measured a mile on each side were represented in a drawing, the smallest object that could be represented in the same drawing would be .97 inches long.

Digitizing tablet An electronic board with a stylus or puck pointer; the position of the pointer is transmitted to the computer.

Dimensions Notations on drawings that indicate lengths and angles. Drawing CADD drawings are close analogs of real drawings. They are 2-D representations of objects.

accompanied by notations such as dimensions. Unlike a model, a drawing cannot be analyzed to determine the strength of the structure CAE Computer-aided engineering. depicted.

> DXF Autodesk's external drawing exchange file format; widely used by other vendors.

Engineering drawing sizes The five standard sizes are: A. 8.5 by 11 inches: B. 11 by 17 inches: C. 17 by 22 inches; D, 22 by 34 inches; and E, 34 by 44 inches.

FEA Finite-element analysis. A powerful way of analyzing physical shares for structural, thermal, and magnetic characteristics. Objects are represented by meshes.

FEM Finite-element modeling or meshing. See FEA.

Fillet A rounded intersection between two surfaces that is used primarily in mechanical engineering. In 2-D design, a fillet is a curve connecting lines or arcs in such a way that they are tangent to it. The counterpart in 3-D design is called a fillet surface.

Floating-point representation A way of representing a number by a pair of smaller numbers; in this pair, the first (or manrissa) is to be multiplied by the base (usually 2 or 10) raised to the power of the second number (the exponent). Thus, 743,000 in floating-point notation would be 7,43/5, or 7,43 times 10 to the fifth power. This technique makes it possible to represent numbers larger than the maximum integer value of a single word in a computer.

Grid A matrix of dots or lines, with user-determined spacing, that can be used to align drawing elements visually. Snapping allows you to use grids to force alignment.

Group To link two entities tempo rarily for certain operations, such as moving or erasing. Some systems use "windows" for this purpose.

Hatching A shading pattern ma up of lines at specified spacings and angles. There are standard hatching representations for various materials-steel, aluminum and so forth

Homogeneous geometry A way of representing geometry in CADD programming in which points, lines, surfaces, and solids share a common mathematical form, allowing a single set of manipulation routines to be used for all objects.

IGES Initial Graphics Exchange Specification. A neutral (nonproprietary) CADD file format defined in ANSI standard Y14.28. CADD software vendors supply programs that translate between their formats and IGES, permitting users to move CADD files from one system to smother

Intersection cleanup ACADD function that climinates the superfluous lines at intersections of double-line entities

ISO International Standards Organization. "ISO dimensioning" refers to a set of drafting symbols for dimensions and rules for their place-

Isometric view A drawing of a 3-D object in which the y axis is vertical and the x and z axes make angles of 30 degrees with the horizontal. An isometric view is used because it gives a measure of realism while permitting measurement with the same scale alone all three axes .

Layers A way of organizing information in a digital drawing so that different versions of the drawing can be viewed and worked on separately. You can think of the process metaphorically as overlay drafting.

Macro A collection of system commands that can be activated by a single code or button. Also used in some systems to refer to a symbol.

Mask To select geometry for exclusion from a subsequent operation.

MCAE Mechanical computeraided engineering. Usually means CADD plus FEA plus solids, with additional tools for facilitating the entire design process.

Mirror To create a copy by "reflecting" an image of the original around an indicated axis.

Model A 3-D representation of an object within a CADD program. A model contains representations of many of the object's attributes and can therefore be analyzed—say, using FEA tools. Contrast with drawing.

MRP Manufacturing requirements planning. A computer-based method for determining materials purchasing needs, based on orders and bills of materials.

NC Numerical control. The control of machine tools through computers.

NURB Nonuniform rational Bsplines. A type of homogeneous geometry constrained to ensure continuity among objects. Several large CADD system vendors have announced plans to use this representation.

Orthogonal view A drawing in which a face of the object is parallel to the drawing plane, and the projection lines are perpendicular (orthogonal) to the plane of the drawing. A six-view orthographic projection is a stundard mechanical drafting representation that provides views of the front, rear, left, right, top, and bottom of the object.

Pan To view a different part of the image without changing magnification.

Polar coordinates A way of specifying location by means of angles and distances.

Polyline A geometric entity consisting of a number of connected lines.

Precision The number of points in the coordinate space, or along each of the axes. This value determines how small an object can be represented in a given CADD system. See coordinate precision.

Raster A way of representing pictures in digital form. The picture is subdivided into pixels, or picture elements, which are like the tiles in a mosaic. A numerical value is stored in the computer memory for each pixel, indicating its color. All PCs have raster displays. Contrast with vector.

Relative and absolute

positioning When locational coordinates are numbered from the origin, while relative coordinates are numbered from the origin, while relative coordinates are numbered from the whether—usually from the last point entered. "Place a point at x = 10, y = 12" is an instruction given in absolute point at x = 10, y = 12" is an location 10 feet to the right and 12 feet up from the present point" is given in relative coordinates.

Scale The numerical relationship between the dimensions of the image and the actual object. For example, architects often draw at a scale of 1/, inch = I foot. In CADD systems, it is usually possible to draw in "raiworld" dimensions; then scaling is handled dynamically by the program and is transparent to the user.

Select Single out, usually with visual indication, for some operation.

Snap Snaps are like point placement magnets: a snap is a point on the screen to which you can move any object you are placing. A CADD user might want to snap an image to a point at the end of a line, a midpoint, or the intersection of two lines. Systems that have snaps usually allow the user to set the snapping range.

Solid modeling Also called volumetric modeling and seometric modeling. Of the three main forms of computer-based geometry-wireframe, surface, and solid-solids are the least abstract and hence the most realistic. But they are also the most processor-intensive; interactive solidmodeling systems are therefore very expensive. Only solids allow you to check interference and accurately analyze the mass properties of the geometry. The two main types of solidmodeling systems are CSG (constructive solid

CSG (constructive solid geometry) and b-rep (boundary representation). CSG systems store only Boolean equations: the system creates geometry by evaluating the Boolean expressions. In b-rep systems, the system actually stores the geometry.

Spline Technically, a parametric polynomial curve whose points obey certain constraints. Used loosely to mean curve. See B-spline and Betier curve.

Surface modeling Required for NC models, surface-modeling systems demand more computational varieties of the surface of the surface was suffaced for the surface for the surfa

Symbol A grouping of geometry and text can be named and stored as a symbol in most CADD systems. It can then be recalled and placed in a drawing, at any scale and angle. Many systems store only a reference to a symbol within the drawing file, so that if the definition is changed, all drawings containing the symbol reflect the change. Some systems also allow symbols to be "exploded" into their component parts, which then become like any other geometry. Also known as a block or component; in some systems, a тасто.

Vector As an adjective, contrasts with ruster. The vector approach to computer graphics crutalis the decomposition of images into edges; the program stores the conditionates of the endopoints of each fig condition of the conditionates of the endopoints of each fig conditionate of the endopoints of each fig conditionate of the program of the program

Window A "virtual reminal" giving the user an access port to the system or data. Windows can be used in some systems to hold different drawings or models: in others, only views of a single drawing or model can be simultaneously displayed. Windows are also used in some programs as a mechanism for grouping drawing elements.

Wireframe A computer representation of 3-D objects in which only the edges are represented. Contrast with surface modeling and solid modeling.

Witness lines Lines extending out from a dimensioned object so that the dimension-labeling text can be placed where it will be legible.

-Joel N. Orr

line segments. Circles can be broken without having to Freeze them.

ARCHITECTS, REJOICE: The real power of the system is hidden until you power of the system is hidden until you see it for architectural drawings. Then you see why Arris is creating such as tim it not exhibitectural community. At last there is a program that understands architectural community, at last there is a practiced by architects! Walls understand that they are walls and behave accordingly. Jo. cops and windows also know what they are walls and behave accordingly. Jo. cops and windows also know what for which was not placed. Buildings made of systems, and Arris knows how to handle those systems well.

Use the \$700 Space Design module, one of the better stacking and blocking programs on the market, to allocate and define building requirements and create bubble diagrams of the floor plan. Then move into the Modeling and Rendering module (\$2.650) for volumetric and 3-D visualization of the design. Go into the Architecture module next and generate the structural system, including columns, footings, and column grids with alpha and numeric bubbles. Use the STAIR function to design the stair system (both plan and elevation views are generated), then use the parametric ELVTR and LAVS functions; to finish off the core plan, go into smart WALLS

After finishing the design, you can go back to Model mode and let the systems back to Model mode and let the systems automatically generate the 3-D model, including elevations, sections, perspective, and axonometric, shaded, and shadowed views. You can then create several views we views, and extended including interior perspectives, save those views, and set up a replay script for an instant live presentation to a client.

constitute of the cilert wants modifications, you don't have to work pecause all the dimensioning and cross-hatching (20 predefined patterns) are associative and change along with whatever walls you move. And since the walls are samely, you don't have to be the walls are samely, you don't have to be the walls are samely, you don't have to be the walls are samely, you don't have to be the walls are samely, you don't have to be the walls are samely to the walls to the walls are samely to the walls to the walls to the walls are automatically generated. The fact of the matter is that if you are an architect and you don't design many buildings that have youten to you.

POWERSHORTAGE It came as quite a surprise to discover that Arris was not able to handle the test gear drawing. The reason: Arris can't snap to an intersection of an arc or circle and another are or circle to an arc or circle and another are as a line or an arc); and it cannot fillet between an arc or circle and any other entity (such as a line or an arc); and it cannot directly mirror about an axis other than the x or the y.

Sigma Design indicated that the ability to work well with circles and ares has not been high on their user wish list, and that most architectural projects can do without it. Nevertheless, it should be available in the next release, due in September.

Arris could also use a complete set of geometric construction tools, more-flexible groups and group control, more-flexible entity selection methods, and better reference documentation for the Solids module.

in only way to run Arris successfully is on 386-based system. Arris tuces a 12-bit on ababise running under an operating system that can give it access to 32-bit manipulations continuously. That means that for any given processor speed, 80386-based systems will ruly give twice the performance. On a fast 386 machine, the program feels very comfortable—even with multimeably terawine files.

PROGRAMMING The optional SIGMAC programming module is recommended. It comes with extensive (but dated) documentation, is extremely flexible. and includes the source code for Arris and a compiler. SIGMAC is a full-fledged programming language with complete access to the database structure. Creating and modifying an on-screen or tablet menu is easy, and there is additional power in Arris that is made available to you with the programming system. A number of third-party developers are also writing for Arris using SIGMAC, and the list of add-ons is rapidly growing.

Another strong feature is the system's automatic periodic backup (you set the interval). If you have an abnormal exit from the system, Arris can recover what you had at least until the time of the last automatic backup.

Arris's documentation has an excellent introduction and tutorial, but reference materials are available only with the

SIGMAC option. The tutorial and introduction materials are well presented, ample in scope, and quite useful, but they need a good index. The documentation consists of two spiral-bound and one three-

ring binder.

Because of its Xenix operating base, Arrix which starts at \$3.850 without the optional modules, is probably the most complex CADD package reviewed her is certainly not for everyone, and it isn't intended to be. Sigma Design has targeted architects for this package, and for them it is one of the best CADD solutions available.—W. Bradley Holtz

AutoCAD

The most difficult part of reviewing AutoCAD is finding something to say about it that hasn't been said before. With over 100,000 registered users and the support of 135 user groups, this ubiquitous package has become the Lonus 1-2-3 of the microcomputer CADD industry and the standard by which all others are compared.

The latest incarnation of AutoCAD. Release 9, sports a reworked user interface complete with Microsoft Windows-like pull-down mems, icon megus, and dainoboxes. It retains both the familiar AutoCAD memu occupying the rightmost region of the screen and the text are at the bottom that displays the AutoCAD command line and input prompts. Although

EDITOR'S

FACT FILE



bilities. Its power, programmability, and the availability of several hundred add-on products make it the standard with which all others are compared. Not copy protected. CIFCLE 608 ON PEADER SERVICE CAPO.

MAX Resolution MAX Scan Frequency MAX Compatibility MAX Dependability



MAX-15

THE HIGHEST RESOLUTION, AUTOSYNCHRONOUS MONOCHROME MONITOR YOU CAN BUY.

The fact is, for outstanding display resolution from an autosynchronous monochrome monitor, the Princeton MAX-15 is your only choice. It's compatible with the IBM PC*, XT*, AT*, PS/2, Apple Macintosh II**, blue personal computers. Responsible features the widest

SE*, and compatible personal computers. Because it features the widest horizontal (15-36 KHz) and vertical (45-120 Hz) auto-scanning frequency ranges available, all graphic standards from CGA through extended VGA are supported! High speed line drawings to 132 column spreadsheets to multiple shades of gray are yours with the MAX-15. Every character and graphic is sharp and crisp due to its exceptionally high resolution (1024 × 768), dynamic focusing circuitry, and auto-pictures sizing features.

Feature packed, the MAX-15 has such ergonomic appointments as an etched non-glare flat screen, removable tilt and swivel base, an exceptionally streamlined cabinet, readily accessible controls, and

small footprint, to name a few.

The MÁX-15 gives you maximum performance, quality, value, and is backed by Princeton's excellent service. It's the Visible Edge. For more information, contact Princeton Graphic Systems at 001 Ewing Street, Building A, Princeton, New Jersey 08540, (609) 683-1660.

PRINCETON GRAPHIC BYSTEMS

*Requires proper adapter card. **Requires AC 100 interface. *Requires adapter such as the Rendition DITP Adapter from Resistance CECL Inc., Constitutes 1000 Controller from Consegraphic Corporation or expansions.

CIRCLE 209 ON READER SERVICE CARD



What we have here is a failure to communicate.

Until now.

Ven-Tel would like to congratulate all IBM PS/2"users.

Now let's talk. Because a complete communications system for the IBM PS/2 has arrived.

Introducing the Ven-Fiel 24/2" Internal Modem for IBM PS/2 models 50, 60 and 80. This 2400 bps modem is fully Micro Channel and OS/2" compatible. It's automatically configured by the system, so no option switches are needed. And, as an option, you can buy the 24/2 bundled with Crosstalk XVIP software.

Like all Ven-Tel 2400 & 1200 bps moderns, quality and reliability are guaranteed by a *free* five-year warranty.

The new Ven-Tel 24/2 Internal Modern is in stock now. For the name of your nearest Ven-Tel dealer or distributor, call 1-800-538-5121.

And start communicating.



Micro Channel, PS/2 and OS/2 are registered trademarks of IBM Corporation. Crosstalk XVI is a registered trademark of DCA.

■ HIGH-END CADD

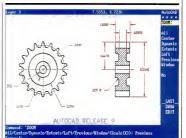
the pull-down menus supplied with the package represent only a subset of the full AutoCAD command set, they incorporate the graphical icon menus and dialog boxes that distinguish the new AutoCAD look and feel from the old.

The advanced user interface is only the most apparent change made to Release 9. A host of refinements and additions were made to increase functionality and ease of mobile to the common of the common

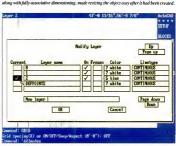
board is not supported. All AutoCAD files created with Release 9 are directly portable to versions of AutoCAD running under different operating systems. Drawing files can now be transported among IBM PCs running DOS, Sun workstations running Unix. Apollo 3000 workstations running Aegis, and DEC Vaxstation 2000 and Vaxstation II/RC/GPX machines running VMS without intermediate translation to the neutral DXF format. This single asset gives Autodesk a decided advantage over other vendors in the CADD arena because most packages, even those at the high end of the price and performance spectrum, are still bound to a specific machine environment.

For compatibility with other CADD systems, Auto-CAD supports Auto-Cek's own DXF drawing interchange format and the more encompassing IcES format. Auto-CAD imported a pair of test files without error and successfully worker and read back its own DXF and IcES files. However, a handful of entities in one file that used different colors for different layers was miscolored after going to ICES and back.

INSTALLATION AND USE AutoCAD comes on ten 360K floppy disks (two of which contain sample files and utilities) and requires about 1.5MB of hard disk space. Accompanying the disks is an excellent 427-page Reference Manual, an Installation and Performance Guide, an AutoLISP Programmer's Reference, and a NutoLISP programmer's Reference.



The gear drawing that we used as a test was no challenge for AutoCAD. The Scale command,



One of the best new features in AutoCAD, Release 9, is the Layer Control dialog box, which displays the full functionality of the Layer command on one screen. You can control an unlimited number of layers from this nems.

"Read This First" guide that contains an introductory lesson for those anxious to get started on their first AuoCAD drawing. There is no installation program; software installation amounts to little more than copying the files supplied on-disk into your AuoCAD directory.

AutoCAD's support of video hardware, digitizing tables, printers, and plotters is second to none; drivers for virtually every input and output device of note are supplied. And Autodesk's ADI (Autodesk Device Interface) specification, none available to hardware manufacturers for the development of their own graphics peripheral drivers for AutoCAD, will help ensure that this support doesn't faller.

The theoretical and the state of the state

Snap grids with user-defined spacings, aspect ratios, and rotations can be set up and displayed for precise movement of the drawing cursor. An isometric grid is available for isometric drawings, and a smortage asphort of object snap modes is provided. One of AutoCAD's handlest features is the Object Snap Overides menu, invoked by clicking on the row of asterisks displayed in the screen medium.

A drawing can be subdivided into an unlimited number of Javers, and cach Jayer may optionally be assigned a color and line type. Layers can be temporarily hidden from view and even "frozen" to improve drawing regeneration speed. The new Layer Control Dialog Box embodies all the functionality of the LAYER command in a single on-screen window. Layer control bas never been easier.

AutoCAD fully supports the use of blocks and block libraries to reduce reducdancy in your work. Blocks can be positioned, scaled, and rotated to be fit into a drawing. Entire drawing files may be inserted as blocks, and blocks can be nested within blocks. AutoCAD furnishes extensive block-attribute support for information management and allows you to extract attribute information in comma-delimited format, dBASE's .SDF format, or AutoCAD's own DXF file format.

AutoCAD supports four basic types of dimensions—linear, angular, diametral, and radial—and offers subsets of the four primary types robust enough to cover most dimensioning situations you'll encounter in the drafting world. Dimensions are fully associative unless you specify otherwise.

AutoCAD offers

the wealth of options for creating and editing geometry that is expected from a product of its caliber.

Arrows, tick marks, or user-supplied symbols can be used as dimension-line terminators. Both baseline and chained dimensioning are supported. AutoCAD comes with a library of 41 standard hatching patterns; you may use these patterns, supply your own, or design new ones on the fly.

ZOOM OPTIONS Zoom options allow you to specify scale, designate a region to be magnified, show all of a drawing or maximize the display to show all objects, or return to the previous view. Zooms and pans can be effected transparently while another command is executing. To decrease display regeneration time. AutoCAD maintains a virtual screen with coordinates stored in integer rather than floating-point format. If you zoom or pan to another region of a drawing but stay within the confines of the virtual screen. the display is simply redrawn rather than regenerated. Redraws help economize on refresh time.

AutoCAD offers the wealth of options for creating and editing geometry that you would expect from a product of its caliber.

Lines and arcs may be grouped together as polylines and treated as a single entity. Objects or groups of objects may be modified. scaled, stretched, rotated, offset, moved, copied, mirrored, and duplicated in radial or rectangular arrays. Lines and arcs may be trimmed at their intersections with other lines and arcs, making architectural drawings and layouts a snap. Applications of fillets and chamfers work equally well with both arcs and lines. AutoCAD's support of spline entities, however, is meager. The only type of spline currently offered, a cubic B-spline, can be created only by first drawing a polyline to establish vertices. then converting it into a spline.

A command stack records each command you execute and allows you to undo operations all the way back to the beginning of the drawing session.

ĀuucAD will use up to 4MB of extended or expanded memory for extended I/O paging space. Since there is no existing standard for managing memory beyond the IMB burrier, and the popular VDISK and IBMCACHE utilities will use it if invoked with I/E parameters, I tested AuucAD in conjunction with both. There were no conflicts.

2-D DRAWING AuoCAD made creating the gear and floor plan drawings required for this review a breeze. The Scale command lets you expand or shrink existing geometry by a Scale factor you specify, making it relatively easy to size and resize objects after the fact. Thanks to the benefits of associative dimensioning, distance of the scale of the

The dimensioning of radii and diameters is one of the few areas when AutoCAD falls short. For example, dimension text can be placed outside a diameter only if the text won't fit inside with the dimension line and arrowheads. You can construct such dimensions yourself using AutoCAD's capability to draw complex leader lines—but with a package like AutoCAD, you shouldn't have to

AutoCAD is as suitable for architectural applications as it is for general engineering drawings. It offers a feet-and-inches draw-

Case History #60102

"With the addition of PC EXPO in Chicago, NETWORLD, MMA Meet-ing & Show, National FinCom and National CASEcon, our data processing needs simply outgrew our existing system," said Steve Ianuzzi, Controller for H.A. Bruno Inc., the trade exposition management company. "We decided to look right in our own own backyard at last year's PC EXPO in New York, and we found that DataFlex provided everything we needed to turn our multi-user system into a powerful database machine."

DataFlex lets us control the data instead of it controlling us. "When we were producing only one show, our database needs were simple: a list of prospect names which could be flagged for invoicing as they registered," explained lanuzzi,
"but with several big shows a year,
that system quickly became overwhelmed. We needed software that would let us control the data instead of it controlling us. One company might be exhibiting in all our shows another in just two. Our accounting system had to be much more sophisticated than simply a list of prospects. Company profiles, listings for multiple shows and all sorts of details were needed in a form that could interface with our accounting system. We found that DataFlex would answer all of our database management needs

A highly automated office thanks to DataFlex.

"Starting in 1988, all of our shows will be run completely by DataFlex. From tracking exhibitors, invoicing exhibit space and registrations to meeting room sales, accounts payable and accounts receivable, DataFlex will be handling every aspect of our operation. We're even moving our payroll work from an

outside firm to inhouse," said Ianuzzi. "Now, what's behind the scenes at our high tech trade shows will be as sophisticated at what's in the booths!"

Take the first step to more efficient program development today. Return the coupon below for your free DataFlex Demonstration Diskette.

Toll Free Sales Lines: Nationwide 1-800-451-FLEX



"Starting this year, all of our trade shows will be run completely by DataFlex."

Stephen-J. Januzzi, H.A. Bruno, Inc., Controller



Data Access Corporation 14000 S.W. 119th Avenue Miami, Florida 33186 (305) 238-0012 TELEX: 469021 Data Access CI FAX: (305) 238-0017

re information, call from your modem 1-800-444-8080 (300-1200 band, 8 bit, no parity 1 stop bit) and enter the access code FLEX16 when prompted

(PC-DOS/MS-DOS ONLY) PCM8/1/88

Find out more about DataFlex's case of use and programming power. Mail this coupon today for your free self-running demonstration diskette.

- Company Address.
- City_
- Phone (
- How many computer systems are in use at your company? Do you use a Local Area Network or Multi-User computer? Data Access Corporation, 14000 S.W. 119 Avenue, Miami, Florida 33186

ing scale and automatically outputs dimension text in architectural format. Its strong support of blocks makes it just as easy to paste door-swing symbols into a floor plan as it is to insert electrical symbols into an electrical schematic or flowcharting symbols into a flowchart.

3-D MODELING Although it offers a limited number of 3-D entities. AutoCAD is not a full-featured 3-D CADD package. Points, lines, extruded surfaces, and simple three- or four-sided planar surfaces known as 3-D faces can be defined in 3-D space. Curved or irregular surfaces must be decomposed into 3-D faces. Three-dimensional coordinates for points that do not lie in the current plane of elevation are entered through a clumsy technique called filtering, in which the user locates a point in one or two dimensions and is prompted by AutoCAD for the rest. Only one view may be displayed at a time, although any xvz location can be arbitrarily assigned to the viewpoint.

But the 3-P functions AutoCAD does have offer an extraordinary amount of modeling power, especially when modeling power, especially when AutoCAD allows any 2-D profile to be extruded into three dimensions by specifying an elevation for its base and a "hischieses" in the z direction. The walls for a floor plan are textuded to an 8-foot height and viewed as 3-D wireframe model in a matter of minutes.

Autodesk has announced that AutoCAD, Release 10, will be shipped by the end of July. Among the major enhancements to Release 10 will be the inclusion of a full 3-D database and the ability to draw and edit all existing AutoCAD entities in three dimensions. Release 10 will also offer perspective viewing.

One of the most exciting add-on products available for AutoCAD is AutoCade's volumed. AutoShade is a own AutoShade. AutoShade is a opostprocessor that converts wireframe models created inside AutoCAD into life to colored renderings complete with perspective, shading, and specular reflection. AutoCAD's ASADDE command (an external AutoLISP program file) allows you to position camers and light sources and light sources and light sources much autoCAD's ASADDE command (an external AutoLISP program file) allows you continued to position camers and lights. Two combinations of cameras and lights. Two

kinds of light sources—point and directed—are supported by the package.

CUSTOMIZING AUTOCAD The hallmark of AuoCAD is the degree to which it can be customized. Menus and help screens can be completely reconfigured to sait individual users. Customized hatch patterns, line types, and text fonts may be added to supplement AusicAD's default palettes. Command sequences can be automated through script files.

Among A. Amo

Cadkey

True 3-D ČADD software is just beginning to trickle down to the microcomputer world. Many packages claim to support 3-D drafting and design, and, indeed, offer a number of features that let drawings exploit more than two dimensions, but on closer examination reveal themselves to be 2½-D tools masquerading as 3-D. If



you've surveyed the CADD market and concluded that no single package offers the 3-D capabilities found in today's mainframe CADD systems, then stop right

there-you haven't seen Cadkey. Cadkey, produced by Cadkey Inc. and priced at \$3,195, features extensive 3-D modeling, design, and analysis capabilities integrated with a versatile 2-D drafting package and a user interface that's as smooth as any you'll find. A few hours with Cadkey will convince you that its 3-D features were added by design, not by afterthought, and that CADD software doesn't have to be difficult to use just because it offers a multitude of features. Cadkey is aimed primarily at the mechanical engineering and design market but is rich enough in features to suffice for almost any engineering or architectural application.

EASY INSTALLATION Cadkey is shipped on ten 360K floppy disks, two of shipped on ten 360K floppy disks, two of drawings. Two notebook-size loosel-ted binders, the User Reference Guide and the Utilities and Customization Guide, accompany the disks. The Cadkey manuals have a less polished look that Auto-CAD's hardboard Reference Manual but are well organized and complete, with labeled tabs

dividing the sections. CadKey, Inc. supplies an installation program to install Cadkey on your hard tids with a minimum of fuss. The program creates a number of subdirectories stemming from the master Cadkey directory you name and create, then prompts you to insert each of the Cadkey disks in turn and transfers the required files. The program does not tinker with your CONFIG.SYS or AUTOENCE BAT files.

ACTOLACE.NAT lines.
Once Cadely is installed, you can begin working with the program immediate or the cade of the

Cadkey uses a hardware key, or dongle, that attaches to your machine's parallel port to ensure that only one copy of the

This chip is too smart to be in a personal cômputer.



Introducing the corporate 386.



The 386-based personal computers offer the individual raw power.

But, in most corporations, the real work is done by many people, all trying to work together. Computers should aid this process, by giving indi-

viduals the personal power they need, and by helping groups of people work together productively.

Different groups need to share and work with the same information, even though they may be using different computers, or their data is kept on remote SALES

RN See PRINCIPLE ENGINEERING

PREMITORS

RUBLITIONS

R RUBLITIONS

In real-world corporate applications, PC users need access to a large variety of computing resources. So the Sun 38 runs Sun's apen distributed computing environment, built around the UNIX* operating system. Which lets it

mainframes.

Personal 386s fall short of meeting these needs. Because they use underpowered and primitive operating systems.

So they can't handle the really demanding applications. And they only talk to themselves, with some difficulty, rather than to all of your computers.

That's why we're introducing the corporate 386. The Sun386i™ workstation. It has the same high-performance Intel* 80386 chip as the PCs.

But not their personal limitations. Because it runs Sun's open, distributed computing environment, built around the UNIX® operating system.

So, you have transparent access to every computer in your company. No matter which vendor's name is on the box.

Unlike the PCs, the Sun386i lets you take full advantage of the thousands of powerful applications designed around the UNIX operating system. But it also lets you run all of the PC

sophistication, isn't a Sun386i harder to use than a PC?

DOS applications that millions of users

And with its 5-MIPS power.

have developed so much expertise in.

run simultaneously and at full speed.
But with all this power and

UNIX and DOS applications can

Not at all. In fact, it's easier.

Because we've given it a friendly, icon-oriented user interface with an integrated help facility. And a file organizer, to easily find, open, and keep track of files all over the network.

There's even an automated network administrator, that lets you personally install the Sun386i in minutes. Instead of hours.

So look to Sun for total networking solutions that help pull a company together.

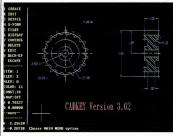
If you'd like to know more, call 1-800-223-6736. In CA 1-800-322-6736. And we'll show you the difference between a personal machine.

And the right corporate choice.



The Network Is The Computer™

HIGH-END CADD



Cadkey filleted and trimmed between the arcs of the gear drawing easily. You can bypass the main menu, displayed on the left, with keyboard commands.



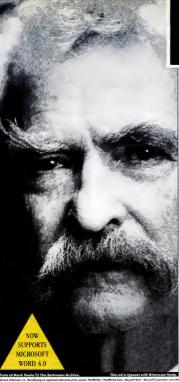
The color-selection window displayed alongside the test floor plan is an example of Cadkey's excellent menu system. You could pan across a screen like this by specifying a particular point as the center of the next view.

software can be running at a time. Dougles are prhaps the least offensive form of copy protection, since you can share the software among machines without being subjected to lengthy install/uninstall procedures and you can freely back up the disks. You're not deprived of a parallel prot because the printer interface cable that you normally attach plugs directly into the back of the dongle.

USER INTERFACE The Cadkey screen is divided into four regions; the drawing window, menu options window, status window, and cursor tracking window. The status window displays the current values of 22 system control parameters such as the view number, snap setting, and drawing color. One of the beauties of the Cadkey user interface is that any one of these parameters may be changed simply by clicking on its name in the status window, even in the midst of executing another command. Having control variables consolidated into a single workspace is more efficient than having them dispersed among branches of a menu tree.

The backbone of Cadkey is a tree-structured menu system similar to AutoCAD's in style but organized in an intuitive fashion that lets you sit down with the product for the first time and explore many of its features without opening the manual. The root menu offers the options Create, Edit, Detail, X-Form, Files, Display, Control, Delete, and Exit, in addition to Back-up and Escape, which are present on every menu to let you regress one level or automatically return to the root menu, respectively. Entities are created and altered using subfunctions under the Create and Edit menus. The Detail menu offers options for adding and manipulating dimensions and text and cross-hatching enclosed regions.

X-Form provides access to a powerful set of functions for moving, scaling, rotating, mirroring, and copying entities or groups of entities. With them you can create radial arrays of objects or approximate a surface of revolution by rotating a planar image around a 3-D axis and leaving joined copies afficie intervals. File functions are tucked away under the Files menu, while Dajelay offers commands to zoom, pan, change levels, refraw the display, and define grids. Delete was placed



ontware for word processing. It won't make you a great writer. But you'll have a face like one.

Bitstream Fontware now works with papular word processors. Including WordPerfect 5.0, Microsoft Word 4.0, and Latus Manuscript 2.0. So no matter what kind of writing you do, you can print it with the kind of typefoces people remember.

They're the some revolutionary typefonts now changing the face of MS-DOS desktop publishing. Which meons you'll be changing the faces on your letters, reports and proposals with the finest prafessional typefaces anywhere. Dazens of faces that look better and read easier That canvey your thoughts and your image more clearly. And that re-

produce perfectly, in nearly any size, an virtually any Hewlett Packard, compat ble ar PostScript PDL laser printer.

See your dealer today. Or call us of 1-800-522-3668 (617-497-7512 in Massachusetts). Ger the simple facts about choosing and using Fontware to print everything you write. Because it you wont them to remember your



words, it helps to have a face they can't forget.

Bitstream*

FONTWARE "

Beautifully Simple

Simply Beautiful

Consider this: How many Pixie menu selections does it take to create a complete bar chart - with annotation, axes, title, and legend? Just one.

How many menu selections are needed to change the bar

values? Add to the title? Change the axis scaling? Add more bars? Would you believe... none.

Zenographics introduces Pixie, a new charting and drawing program with the simplest, most obvious user interface yet devised for presentation graphics.

In technical terms, it's called direct manipulation. To you, it means instant learning - and because it's so visual, Pixie is one program you'll never forget how to use.

Based on Microsoft® Windows, we think Pixie is the best example vet, in any software category, of the power of the graphical user interface.

Deep down, you know why you invest in graphics: you want to look good. You want to impress, to entertain, to inform, to sell,

> Pixie can make you look good, Just because it's simple doesn't mean it isn't beautiful - great color, shaded backgrounds, clean typefaces, drop shadows, 3-D effects, and more,

> > Take a look at the slide on the left. Does it look like it could be created by a graphics amateur? In 10 minutes? With a \$195 graphics package? Thousands of Pixie users are making this very image: it's Lesson 3 (just six pages) in the Pixie manual!

Pixie is Zenographics' newest winner. It connects

beautifully with our flagship product Mirage - the PCbased tool of choice for graphics professionals. Through Mirage, Pixie gains access to the best and most complete output device drivers, and to the artistic expertise of thousands of Mirage power-users worldwide.



	Pixie	Harvard Graphics	Freelance Plus
Graphical user Interface?	Yes (MS Windows)	No	No
User interface technique	Direct manipulation	Fill-in forms	Fill-in forms
Editing preserved if chart changes?	Yes	No	No
Screen Fonts	Windows. Bitstream, Mirage	Helv, 1 hardware font	Stick
Maximum colors per image	16 million (Windows limit)	16	12
Compatible with professional systems?	Yes (Mirage)	No	No
Price	\$195	\$495	\$495



Our form







For dealer locations or product information, call (800) FON-PIXIE (800) 366-7494

For credit card orders, call (800) 222-9409



CIRCLE 325 ON READER SERVICE CARD

at the root menu level for quick access. And the Control menu option offers a smorgasbord of functions for entity verification, plotting, printing, and altering system variables if you don't care to go to the status window directly.

There is no command line for keyboard entry, but mean options may be selected using the function keys. In addition, Cadkey offers a set of Immediae Mode commands for keyboard shortcus. Alt-A, for example, rescaled displayed entition for example, rescaled displayed entition of fifthe drawing window exactly, while CTLF files the current part to disk under the control of the property of the control of the contr

I found that I could consistently draw faster with Cadity than with any other package I've used, thanks to the human engineering aspects of ids edsign. Not aspect with an object snap menu and given the chance to examp menu and given the chance to have a submatically presented with an object the way points are identified each time a new set of points is to be selected, and the menu remains displayed until you've finished the operation. Cadity does expertishing possible to save you keystrokes and pointer movement.

TEST DRAWINGS Cadky passed the gear-drawing test with flying colors. To construct the gear, I created a point to construct the gear, I created a point of three-point are represented on the end of the are drawn of the color of the took of the color of the took. I then joined an arrepresenting the top of the took. I then joined an arrepresenting the result in a relation of the gear to one side of the completed took and duplicated the result in a relation and duplicated the result in a relation and duplicated the result in a relation grant duplicated to most the fillet.

Dimensioning is fast and flexible. Cadkey lets you specify where dimension text is to be placed, even when applying a dimension to a radius or diameter, and adjusts its leader lines accordingly. Changing dimensioning parameters such as text height requires nothing more than a quick trio to the status window.

Cadkey provides a counterpart to AutoCAD's versatile Scale command to resize a collection of entities, given a com-

mon base point as reference, but does not offer associative dimensioning. Cadkey successfully increased the size of the gaze by the 1.25 Scale factor I tested it with. Without associativity, I had to redimension manually.

For the sake of sound drafting practice and exercising the CADD package, I placed geometry on one level, dimensions on another, and text on a third. Cadkey will handle up to 255 levels and permits entity selections to be made by level when desired.

The architectural drawing posed few problems. To begin the floor plan, I set the drawing cursor to snap at 1-foot increments and roughed in the walls. Lines are easily trimmed at their intersections with

■ Unlike many CADD packages, *Cadkey* lets you construct a single 3-D model and derive several views from it.

little or no reconstruction required. With the outline laid, I. Fefined the span grid and selectively noomed in on areas requiring detail work to apply the finishing touches. Cadley lets you pan across a drawing by selecting the point that is to be at the center of the new lew, a fast method that should be incorporated into all drawing packages.

from the rest of the field is in the area of 3-D modeling Unilkin many CAD Davids ages that require you to generate individual views of a part separately. Cadily, post construct a single 3-D model and derive was from its Eight view—front, bick, top, bottom, left, right, isometric, and assonantiti—are precedinged, and more official views from its Eight view—front, bick, top, bottom, left, right, isometric, and assonantiti—are precedinged, and more official views from the proceding of the proceedings of the proceding of the proce

3-D DESIGN Where Cadkey stands out

my gear drawing by modeling it in three dimensions, then picking the two 2-D views from the model. Cadkey offers a powerful Section function to section collected entities at a specified cutting plane.

accelerations as specialized relating plane. Still lacking is the ability to generate a curve defined by the interaction of the same ADD purposes. Without a prohibit warround of manual manipulation or a separate CADL program. Cadley card handle state reviewers to test 3-D drafting capabilities, because the drawing includes a pair of complex intersecting surfaces. To its creating at least a mesh representation of the without health of the control of the

Cadkey permits only one view of a model to be displayed at a time. Extracting independent view from a wineframe model and pasting them onto a common drawing surface requires the intermodiate step of creating patterns depicting the views. The package would benefit from a streamlined method of selecting and combining views.

Cadkey's Solids Synthesis program removes hidden lines from wireframe models. Solids Synthesis is to Cadkey what AutoShade is to AutoCAD, a postprocessor that produces shaded color renderings from wireframe models. Solids Synthesis is more ambitious than AutoShade in that it computes mass and inertia properties and attempts to interpret your wireframe geometry for implied surfaces, rather than requiring you to specify where surfaces lie. I used it to shade a handful of sample parts and quickly found that output as sophisticated as this doesn't come without a price: it took time to learn, errors were difficult to diagnose, and the user interface didn't measure up to the Cadkey standard, but the results were impressive.

OTHER FEATURES Also included with Cadkey is an IGES translator for the exchange of 2-D and 3-D product definition data between Cadkey and other CADD systems. The ability to read and write DXF files is supported without any add-on modules, but Cadkey failed two tests of its ability to handle DXF files. One of the drawings Cadkey could not import

correctly was a DXF file it had written itself. The basic geometry remained intact, but dimensions and hatch patterns were missing altogether, colors were disregarded; and selected fillets were converted to full circles.

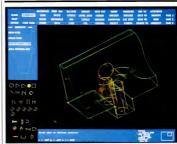
The latest update to Cadkey, unavailable at review time, features an enhanced user interface with optional icon use and editing capabilities across multiple windows. Also included is full 3-D associative dimensioning, an on-line text editor, and a variety of masking options. An upgraded, optional version of Solids Synthesis will let users create an object as a wireframe and then use it as a solid, or vice version.

A variety of learning aids are available, including an optional Teach facility that endows Cadley with on-line help and tutue-line. Cadley in general, is a pleasure to that, untile, many of the low-end CADD pockages for the CP, which are fall or pleasant surprises, Cadley's command features work as advertised and net you work the way you think, not the way Cadley wants you to think. As this product matures, look for it to be counted among contenders—after Prosise

CADmax 3D

Vector Automation's CADmax 3D is a three-dimensional wireframe mechanical design and drafting package that runs on 286- and 386-based machines under DOS using protected mode. It has a complete 2-D mechanical design and drafting package within it that is transpurently integrated so that the 2-D and 3-D modes can operate simultaneously with the same drawing. CD/max is targeted at mechanical designent and the control of the control of the protection of the control protection as Auto-15-000pc, Caddley, and Personal Designer—not Auto-CAD. CADwarcs to graft-

CADmax is a full (and optimized) version of the turnkey systems that Vector Automation still sells for VAX systems under VMS, and it is very powerful. In bringing the program to DOS, the developers have managed to squeeze every last drop of power out of the host systems with two tactics: First, by using the protected

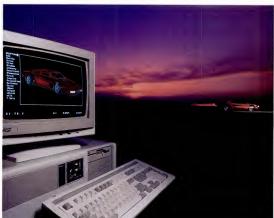


CADmax is able to construct 3-D images and rotate them (the blurred edges of the object indicate the rotation). One of the three pages of CADmax's main menu displays at the top of the screen.



CADusax easily turns the 2-D test model into a 3-D object. The Levels Menu (left) helps you keep track of the object's specifications.

Ultimate Power. Ultimate Confidence. Ultimate Freedom.



Experience 20 MHz 386 Power, AST Style

The sky's the limit. That's how you might describe the power-packed capabilities of the AST Premium™386 ... and how far we'll go to pro-

vide outstanding products, service and support. Only the 20 MHz, Premium/386,

with its advanced bus technology (SMARTslot*) and uncompromising compatibility, eliminates the traditional restrictions placed on an AT*'s performance and speed while providing future upgradeability

You also get the comfort that comes from choosing a company with a solid worldwide reputation for reliable. high-quality technology

So while others are caught up in compatibility and support problems, you're completely free to enjoy the highest AT-compatible '386 system performance available today... and take advantage of performance-oriented upgrades in the future using SMARTslot architecture.

And because of our many years of working with key leaders in the industry, we're able to maximize the capabilities of the most advanced operating systems and application software available, including MS® OS/2 from AST, IBM® SOS/2" UNIXI" WINDOWS® 386 and MS-DOS® For more information call

(714) 863-0181 and ask for operator AA8, or fill out the coupon below.

	me more information. an AST representative call me
Title	
Соприну	
Address	
City	SketeZip
Phone AST Research, Inc., 4992 Attn M C	2121 Alton Ave., Irvine, CA 92714- PC 8/88

AST.

Times Have Changed.



mode of the 286/386 chips, there is no 640K limit under which to run the program. You have the ability to use special memory management to get very large drawings in RAM space. Operation is therefore speedier, and an included DOS shell program will free upwards of 120K to 180K of RAM for other uses while within

LE 606 ON READER SERVICE CAR

the program.

Second, CADmax makes excellent use
of the multiple planes of the graphics
boards is supports. On an eight-plane
board with CGA (normally 256 colors),
CADmax tues Gorn planes for the drawing
(16 colors), one plane for the custor, one
plane for dragging, one plane for highlighting too that it appears in freature to reeverything etc), and one plane for grids
rear of the drawing). This allows freedom
or custom to the drawing in the drawing
or custom to the drawing in the drawing
or custom two custom to the state of what is happening in the drawing area.

USER INTERFACE CADmax is a heads-up-type CAD system: it is designed so that the operator does not need to take his eyes off the screen. Having a tablet is

not any advantage with CADmex tunkes, you actually want to digitize something, but if you want to use a mouse, get a high-resolution model. The screen is divided into six discrete areas; primary menus across the total control of the control of th

Picking a box in the primary area will either activate a specific secondary menu area or switch (page) over to a different set of primary commands. The menus as supplied come with three 2-D and one 3-D menu pages. The secondary menu area, as the Detail Menu, provides you with all the subcommands and parameters perifient to that command, sometimes with many alternative preset selections available.

The procedure for performing editingand manipulation-type functions is different from that of most other CADD systems, though not necessarily better or worse: and is not unlike Reverse Polish Notation used by Hewlett-Packard's calculators. With most other CADD packages, you pick a function and then pick what you want it to work on. With CADvance, for example, you select Move, then choose objects, and then choose the "from" and "to" points. With CADmax, first you select the objects you want affected, then select what you want to happen to them. The Select command chooses the object, the Transform menu gives you the available Functions, and

then you give the parameters. After a while, this system becomes quite natural, with a feeling of a "modellessness" toil. The only functions that are transparent are Window, a display function that has Pan, Zoom, and other commands within it, and Snap, which has everything in it but the kitchen sith and quadrant snap. These commands become transparent when you cut if them by touching the status display, which then drops you hake into whatever else vo are drow but here in the status display, which then drops you hake into whatever else vo are drow.

The status area has an outline of the world boundaries (as currently defined) with a box within it indicating what the display window contains within the world—sort of like a key plan you might find in a large office project's set of drawings.

You may choose to place symbols in

the symbol selection area so that you can select them graphically and place them within a drawing.

MULTIPLE ADVANTAGES CADmax's dynamic 3-D manipulation really sets it apart from other programs, and the entire program is relatively easy to learn, especially when compared with other 3-D systems.

CADmax is also notable for the completeness of its functions. While it may not have everything in the book, what it doshave is fully implemented. For example, while bezier curves are not supported, cubic splines are, with parameters such extightness of fit, force to angle at a particular point, and an essentially unlimited number of points; per spline, AutocAD allows only ten). These are true splines; they do not consist of time segments.

The polar grid function is excellent as well. Set the grid to a 30-degree angle with integral radial steps and lock it to the cursor, and you have an instant isometric machine. One other thing you'll notice: the fact that the system repaints the screen during commands helps speed desirn flow.

Orthographic projections are extremely easy to set up because they are inherent in the system, and dimensioning is fully associative. You create dimensions in 2-D mode and attach them to 3-D objects. There is a full selection of dimension types and parameters.

ČADmax contains ten predefined arrowheads (the ones from IGES), but there are no user-definable arrows. There are also no symbols for tolerancing, but CADmax does have extensive provisions for tolerane notation.

CADmax allows you to have multiple 3-D views on the screen at the same time, and all are updated automatically. You can start a line in one view and select a point in another view if it is easier to find there.

TRUESURF Three-dimensional properties are available with TrueSuff—an \$800 surfacing module that is slated to ship at the end of the summer. TrueSurf gives you the ability to develop intersections of surfaces, to use automatic and dynamic hidden-line viewing, and to create surfaces of revolution. It will not handle Boolean geometry of subtracted solids directly (for

5751 Rickenbacker Road, Los Angeles, CA 90040 **ALTEC Technology Corporation** Tel: (213) 888-9100, Fax: (818) 284-1100

ORDER

1-800-255-9971



documentation is supplied in a handsome linear in some respects. For example, it comes with both wrapped binder with matching slipcase. The chas The ALTEC-286 does go beyond the bare mini

It worked with the 3%-inch disk drive I installed. In the ALTEC-286 tumed in some of the best performance times of all the machines tested. passed the DOS2.0 and OS/2 compatibility tests connectors that hang off expansion cards ... short, it ran fine. What more can there be?

PU speed switch and a hardware reset button. The has cutouts in the back to mount those extra por The ALTEC-286 ran refiably during our tests. - prior aggressively low for this level of

ALTEC-XT/10 Turbo System"

ALTEC-286/10"

ALTEC ZIP-386/16"

• 4.77/10 MHz dual speed 640K RAM

 Serial port/parallel port/game port Case with reset/turbo button 150W power supply Clock calendar

20MB 360K floppy disk drive 1 year limited warranty 84 keys keyboard Phoenix BIOS

HDD/FDD controller card with cable;

 year limited warranty 200 W power supply ● 80286-10 CPU

Phoenix BIOS SI2K RAM

HDD/FDD controller card with cables

101 keys enhanced keyboard 4.77/6/8/16 MHz Software 1MB Static Column RAM 1 year limited warranty 1.2M floppy disk drive 200W power supply Selectable Speed 80386-16 CPU

101 keys enhanced keyboard

 1.2M floppy disk drive • 6/10 MHz dual speed

	•
STREET,	
	į

\$1100,00

\$ 950.00

Mono System

\$1350.00 \$1500.00 \$1550.00 | \$1700.00 \$1995.00 \$2145.00 \$1350.00 40MB

\$1200.00 20MB

> Mono System Color System EGA System VGA System

\$2350.00 \$2500.00 \$2700.00 \$3145.00 40MB

> Mono System EGA System Color System VGA System

\$2550.00 \$2995.00 \$2200.00 \$2350.00 20MB

* Various Options are Available \$1250.00 \$1450.00 \$1100.00 \$1300.00 Color System EGA System

Call for detail information



27,343 Words From Our Engineers To You...

"We've been hard at work on major enhancements to our 3-D design package. We were so excited about these tools, we couldn't wait to tell you about them ourselves. These are the new features you'll find in CADKEY 3TM

(Version 3.5):

• "Construction planes for increased flexibility in 3-D

construction.

• "Multiple viewporting for speed in entity selection and enhanced visualization.

 "Associative dimensioning to automatically update dimensions when geometry is changed.

 "Enhanced masking to allow entity selection by graphics attributes.

 "Increased geometric curve functionality including elipses, hyperbolas, parabolas with tangent, normal and intersection support.

 "Significant dimensioning enhancements, including an on-line text editor.

"CADL™ (CADKEY Advanced Design Language) additions including a compiler for speed increases of un to 4 to 1.

 "More graphics features such as pull-down menus, dynamic view creation and icons.

 "Increased support for many new graphics cards, including a graphics-compatibility kit so you can write your own CADKEY

drivers.

"And coinciding with
the release of CADKEY 3
(Version 3.5) will be
CADKEY SOULDS This

CADKEY SOLIDS To This unique solids modeling engine, which converts wireframe models to solids, has Boolean operations, in-

has Boolean operations, increased shading capabilities and an object-oriented database, in addition to its current shading, hidden line removal and mass property calculation capabilities.

"And our new enhanced IGES bi-directional translator supports all of the new CADKEY 3 features and is considered an industry standard

"We think CADKEY 3 is the best PC-CADD package there is because we've spent our time listening to you.

"We were 3-D from day of [January, 1985]—because we realized its importance in real-world design. Having 3-D now isn't news. But having 3-D credibility in the demanding engineering industry is!

"So don't be surprised if you see our lights burning late at night. Making 3-D easy is hard work!

"There you have it! Any questions? Talk to one of us. We'll be glad to tell you more . . . engineer—to engineer!"

CADKEY INC. Copyright 1998, CADKEY INC, all rights reserved.



And Now The Remaining 27,000 Words... If a picture is worth 1,000 words—then in 3-D they're worth 3,000!

Announcing the new CADKEY 3!





Icon-Assisted Menus



Unlimited Construction Planes



Associative Dimensioning







Mass Properties/Shading



· Now included with CAD-



Graphics Driver Tool Kit

 "CADKEY 3 was ranked the #1 ("overall evaluation") 3-D PC-CADD system by National Software Testing Laboratories (Software Digest. May 1988). CIRCLE 503 ON READER SERVICE CARD

KEY 3: our Basic IGES translator, SOLIDS SYNTHESIS™ a DXF^{TN} to CADL^{TN} bi-directional translator and a set of CADL utilities programs.

• 40,000 systems in place worldwide. Over 170 links to manufacturing and analysis systems. International Dealer and

Support Network. Seven foreign versions. YES! I'd like more information about CADKEY.

We'd like you to have more information about our product line."

"Return the coupon to CADKEY INC, 27 Hartford Tampike, Vernou, CT 08066, see the CADKEY dealer nearest you or call (203) 647-0220. FAX: (203) 646-7120.

510 600 7223."



ľ	Company Name				
П	Address				
ı	City		State	Zin	
ı	Phone	Fut	.,,,,,,		
ı	Do you currently use CAD	FEV	-		
Ľ		l no			
		-			
/	If no, what software do you	use?			

My company's main business is

My current need for a CADD system is: ☐ Immediate ☐ 6 mos-1 year example, "subtract this cylinder from that surface and give me the resulting surface with the proper hole in it"). You will need a solids package for that.

CADmax's user programming has impressive capabilities, but it isn't simple to master. The macro language is intended to be used by operators, the programming language. CPF, by the system manager or programmers/third-party developers, CPF (CADmax Programming Facility) is an interface tool set that allows you to program for CADmax with any Microsoft family language, such as C, Pascal, FORTRAN, and assembler. You supply the compiler, and CPF provides you with the commands to access the database. You can access the database only through the command structure. This is to prevent corruption of the database itself

WISH LIST Even with all these features, there are a few things that future versions of CADmax should contain. They include an on-line help facility, algebraic coordinate entry, windowing with entity masking, a library of public domain menus and macro routines that's accessible without a modern, more and better "narenthetical" or Interrupt command functions, and more user definables like text fonts, arrowheads, line types, and cross-hatching patterns. The program also needs better error handling (it has no undo command) and the ability to cancel out of a command that is taking a very long time to execute-or at least supply a warning that the execution might take a long time.

În general, CADmar's documentation is very good. All of it professionally presented, ample in scope, and quite useful. The command definition section is dry, though, and could be illustrated with more examples. The manuals are indexed well, and all 1,600 pages come in an 8½- by 11-inch three-ring binder.

Even without the features that I'd suggest for future versions, CADmaz, which sells for \$3,950 (including on-site installation), is a powerful program. The fact that Vector Automation maintains an electroic bulletin board for CADmaz tips ((301) 433-0508; 1,200; 8, N, 1) indicates the popularity and success of the program. Relative to other packages run on the same platform, CADmaz's memory-handling tricks make it feel quite fast, especially when you're dealing with very large drawing sizes. If you're looking for 3-D image manipulation, CADmax 3D is worth a try.—W. Bradley Holtz

CADvance

CADvance is not a new CADD package, additionally its cardination of the control o

Like Cadkey, CADvare comes with a hardware security device that attaches to the parallel port. The manual advises that may attached prepheral must be powered on for the security device to work with CADvaree. This device was not transparent to other applications, the duting DOS, as a state of the device was not transparent to other applications, the duting to the security device managed to put the printer into a mode in which nothing would print. This mode could not be reset until the security device was completely removed.

guage that is a pleasure to use.

MENU STRUCTURE: The menu strucure is two levels deep, for the most part, with various options available under each command. The main-menu options are listed on the right-hand side of the screen, and the options on the menu level below appear just to the left of the main menu. Status and prompt linea appear along the bottom of the screen, and a mouse or digitizing table its word in point to the desired thing table its word in point to the desired integration of the screen, and a mouse or digitizing table its word in point to the desired integration of the screen, and a mouse of the mouse one selects the command and the other about its when you are done.

Besides using the mouse or digitizing tablet to point to the various commands, you can use the keyboard to invoke commands by pressing the Slash key followed by the first letter of the command. The function keys provide an easy way to jump from the drawing section of the screen to the ment or status line, and individual satus lines can also be changed efficiently from the keyboard. Fou needs it use the fact, you need learn only eight keys (last fact, you need learn only eight keys (last the curror keys) to make efficient subset of the package. At total of 20 keys are defined for special purpose.

CADvance supports nested commands as well. The Zoon, Pan, Grid, View, and mucro commands can all be executed from within the other commands. For example, one end of a line can be selected, the view panned, and then the other end placed. The snap setting for the nested commands is independent of the underlying cursor snap, so the position selected for a zoom does not have to be on a grid just because the line being drawn has grid snap on.

The size of your drawings, as well as several features such as the number of windows you make, are limited only by disk space because the program swaps data between RAM and disk as required. A help command, available from the main menu, gives brief explanations of the command names but does not give technical descriptions of the commands.

The structure of the menus makes this program feel more natural for architectural drafting. The two-line command to draw walls is displayed directly below the Draw Line command near the top of the menu. Construction line creation is buried under the Draw Construction command. However, once



CADVANCE

CADvance, Version 2.01 Isicad Inc. 1920 West Corporate Way P.O. Box 61022 Anaheim,CA 92803 (714) 533-8910

List Price: \$2.795 Requires 264,386, or compatible: 640K RAM: DOS 2.0 or later. Mouse or digitizing tablet recommended. In Short: Although CADsunce does not support true 3-D modeling, it is fast, versaile, and easy to use as top-quality 2-D package. Copp protected.

The CalCom tizer Fa

Now in A, B and C sizes.



1. Flexibility. Quick menu picking. Also high resolution tracing and drawing. And selective resolutions of up to 1.016 lines per inch.

2. Features users want most. Sleek, rugged, wedge shape. Convenient built-in stylus holder. Adjustable plane positions. Power on indicator. Removable template overlay holder. Color matched to most PCs and workstations.

3. CalCompatibility. Supports over 50 major CAD and graphics software packages. AutoCAD. VersaCAD, Zenographics Mirage, and Ventura Publisher. Just to name a few.

4. Built-in reliability. CalComp's advanced technology reduces the number of electrical components.

5. Warranty commitment. We back our DrawingBoard with a special five year warranty, too. With DrawingBoard you get a complete digitiz-

ing system, including your choice of a 4 button cursor and pen stylus. Or a 16 button cursor instead. Plus power supply and cable. Combine all this with a low price. And there's only one conclusion you can draw on. CalComp's DrawingBoard digitizers. Call us at 1-800-CALCOMP. Or write us at

CalComp, P.O. Box 3250, Anaheim, CA 92803.

We draw on vour imagination."

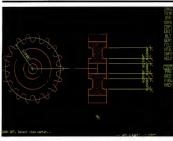
We draw on your imagination and DrawingBoard are trademarks of CalComp Inc. Mirage and Autorium are trademarks of Zerographics.

AutoCAD is a trademark of AutoDesk

VersuCAD is a trademark of VersuCAD Corporation. © 1888 CalComp In:
Ventura Publisher is a trademark of Vernura Software, Inc.



■ HIGH-END CADD



The hatching features of CAD vance are particularly flexible. CAD vance lets you generate any shape or pattern and use it either as a line style or as a hatching pattern. The mouse interface for the program is ideal: the cursor moves rapidly and positively, yet it is not hard to place around commands.



CADvance cannot do true 3-D modeling, but it does have projection capabilities. You simply select a dimension in the z-axis, then stretch the object out along the axis to give it depth.

you are in this command, drawing lines that are tangent to curves is easy.

The open, close, and fix features of the package are unique and useful. The Open and Close command is used to insert a symbol (such as a window) into an existing line or double line (a wall, for example). The line is selected: the basepoint, or origin for the symbol, is chosen; and then the direction from the basepoint for the symbol is chosen. The program then automatically breaks the lines, inserts the symbol, and closes the lines up against the symbol again. This feature is especially useful for architectural drawing, as well as for piping diagrams or HVAC (heating, ventilating, and air conditioning) applications. Corners, as well as T and Y junctions, can also be tidied automatically, not just with the normal trim and fillet functions. This junction command will work with single or double lines; the required corner is simply surrounded by a selection window and the command selected. The package lacks a chamfer or line-extension feature, but its other editing commands are logical and efficient

The Texture command is another of CADvance's areas of strength. The hatching textures are user defined and are stored as separate files. It's possible to texture lines, as well as areas, with any pattern. Hatching can be regular, random, or semirandom (used for curved surfaces), and the areas do not have to be bounded by lines on the drawine.

CADvance does not support 3-D drafting, but it can do oblique, isometric, and perspective projections. These views are more versatile than the ones offered by AutoCAD, but you'll find that this feature is of limited use. If you want true 3-D, you should use a true 3-D modeling package.

BRIEF DOCUMENTATION The doccumentation comes in two manuals: the first devoted to the program itself and the second to the macro programming language, database extraction, and hardware-specific installation instructions. The explanations and examples are brief and accurate, but there is no attempt to explain the differences between drafting on paper and via CADD. The commands are explained but not out into PC context.

CADvance has an interesting approach

You Take Care of Business! Abraxas **Takes Care of the Books.**





The first truly 'transparent' Business Management/Sales/Accounting Software available for the PC

You enter Checks, Deposits, Invoices and Credits. Write-up Proposals, Sales Agreements, use our Point-Of-Sales, Pick Clients off Scrolling Windows, Deposits from the Check Register, Dates from the Calendar, Pop up the Calculator, the Rotary File, Aging Windows, Abraxas Debits and Credits your Journals and Ledgers in Real-Time, Accrues

your Payroll, Rentals and Debt, Reverses and Adjusts and even Dials your Phone -Automatically! Track Sales Leads, Meetings and Tasks, maintain an incredibly sophisticated Mailing List. More than 250 Reports with User-Defined Levels of Detail.

A/R, A/P, General Ledger, Sales, Point-Of-Sales, Inventory, Payroll, Rental Property, Notes, Office Utilities, Checkbook (Cash Receipts and Disbursements) in one program for \$695.

Binghamton, NY 13902 CIRCLE 165 ON READER SERVICE CARL





Now that the best name in CAD is this affordable, why settle for a generic brand?

What's in a name? When it comes to the Autodesk name, a lot. In fact, it's the bestselling, most well-respected name in the CAD business. There simply is not another company with the credentials to make that claim.

with the credentials to make that claim. That's why you shouldn't settle for anything less than AutoSketch," the best way to get started in CAD. AutoSketch is the precision drawing tool from the Autodesk family of products. Not only is AutoSketch priced at just \$79.95," but unlike some entry-level CAD products, you don't have to keep spending more to add the features AutoSketch already has. Standard features like boxes, circles, stretching, mirroring and rotating—to mathematical precision. And advanced CAD capabilities like dynamic PAN and ZOOM and automated dimensioning and scaling, in up to 10 working layers. Of course, if you do want to move up from AutoSketch at some point, your files can easily be uploaded into AutoCAD.*

AutoSketch runs on IBM® PC/XT™/AT®and 100% compatible computers, and supports IBM's PS/2.™

So if you're ready for CAD, why not go with the name that rates highest among both critics and users? Anything else is, well, second-rate.

To order your AutoSketch directly, call

1-800-223-2521. For the name of your nearest AutoSketch Dealer or for more information.

for more information, call 1-800-445-5415 or write to AutoSketch, 2320 Marinship Way, Sausalito, CA 94965.

AUTODESK, INC.



ci-enhanced version (9 times faster), requiring a math coprocessor, is available for \$97

to Sketch and Auto CAD are registered in the U.S. Patent and Trademark Office by Autodesk, Inc. IBM and Personal Computer AT are registered trademarks of

to attributes and database generation for drawings. With the latest release, attributes assigned to symbols are contained in a database that can be imported into dBASE III. Earlier vensions had a dBASE III. Bartier vensions had a dBASE III. Besterner vensions had a four the company of the company of the comtext of the company of the comtained by the company of the comtained by the comtain

CADware's features would be several times the length of this one. The program is slightly limited in its mechanical drafting capabilities due to its lack of a chantler command and lack of flexibility in the placement of dimensions for area and circles, but these are trivial problems. If you do not need true 3-D drafting, CADware is an excellent choice. Its well-designed will make high-level CADD easier for you than it's ever been before.

-Caroline Halliday

DataCAD

Microtecture Corp's DataCAD is a \$3, 195 CADD package most suitable for architectural drawing. Like CADwance, the program has an easy method for inserting doors and windows into drawn walls. The basic DataCAD package operates in a 2-D environment, but a 3-D modeler and an application language module are available at an extra cost.

Like most other CADD packages, DantoAD makes use of amouse ord eligizing tables for mens selection and drawing, and it also allows keyboard entry. The major difference between this program and office of the control of the control

If you need scales that are different from the manufacturer's supplied scales, you can specify alternatives, save them in a file, and retrieve them into other drawings. To be able to draw the test's gear figure, I had to specify new scales that would allow a portion of a gear tooth to be viewed. On several occasions I wanted to be able to see the image just a little bigger and was not able to achieve this easily.

MOUSE OPTIONS The program supports several manufacturers mice, but it has a particularly nice implementation for three-button models. One button selects the point; the center button will snap to the nearest object; and the other exits the func-

und many ways the 2-D program is easy to use However, charing the esting 1 obtained a "Fatal Enroc 2101 REAL mash worflow" error on several occasions. This happened during general editing on a rea. The error rudely dumped me back to DOS. Considering that I was working with Version 3.5 of the program, encourantering a bug like this was a susprise. The
terring a bug like this was a susprise. The
which saves your file every 5 minutes by
default; suddenly became quite useful.

DataCAD's architect men allows winddows and doots be entered automatically. Unlike most other programs that require a symbol for a window. DeataCAD will insert windows and doors of various types and sizes in a fashion similar to that of drawing a line. Each of the door's window's parameters, such as glass thickness and width, can be altered before enty. Some of the parameters affect the window in the 2-axis and are visible when used with the 3-D veser (supplied as a standard with the 3-D veser (supplied as a standard

feature) or the 3-D modeler. DataCAD has an interesting on-screen template feature. The template menu allows the selection of a template file that contains a group of symbols. For example, one of the supplied templates contains the symbols for a sofa, chair, desk, and several other pieces of furniture. The right-hand side of the screen is taken up with this template, and the drawing area is reduced to one-third of the screen. However, symbols can be entered into the drawing simply by first pointing to the template with the mouse and clicking button 1, then moving to the required position in the drawing, and then selecting the position. For mechanical drafting, the program



DataCAD, Version 3.5
Microscente Cop.,
Towers Bidg.,
4th Boor
124 West Main St.
Charlottesville, VA
22903
(804) 295-2600
List Price: \$3,195 with 2-D Modeler: DC
Modder, 3-D Modeler, \$495; DCAL Applications, \$295.

Requires: 286, 386, or compatible: 640K RAM; DOS 3.0 or later (3.1 recommended). Math copposessor, mouse or digitating tablet, hard disk of 20MB or more recommended. In Short: A 2-D environment with optional

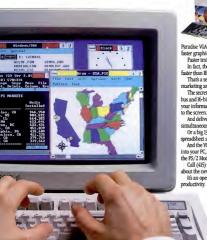
3-D modeler. It has an unusual approach to viewing drawings and has many destrable features. A new version that was due out in May may remove many shortcomings. Copy protected. CRECE 644 ON FEADER SOWCE CARD

gets mixed reviews. The fillet and chamfer function will work only on lines and not on circles or ares, but the ability to rotate the grid to any angle is extremely useful. The tangent function allows lines to be drawn aline or an are. Alarge number of standard hatching patterns are supplied with the program, including the industry standards for steel, concrete, and brick. Linear and angular dimensioning are supported. Radii or diameters can be differentiated, and the circle of the control of the circle of the control of the circle of the

The optional 3-D modeler is an integral part of the 2-D package once it is installed. Its documentation consists of two chapters that are inserted into the middle of the User Guide for the 2-D program. This section of the manual gives clear explanations of 3-D entities but is poorly structured; hence uses unfamiliar with 3-D modelers (and even those who know something about 3-D modeling) will find it difficult to use.

The Applications Language add-on package was not evaluated for this review. It is a programming language that allows DataCAD to be customized for particular requirements. Microtecture recommends that you understand Pascal or Modula-2

Open your windows faster.



Introducing the Paradise WGA Professional™ card. It gives you faster graphics than you've ever seen before. Faster text. Even faster scrolling.

In fact, the VGA Professional is up to 400% faster than IBM's * PS/2 * Display Adapter. That's a serious headstart for your sales,

marketing and financial reports.

The secret of our speed demon is a new 16-bit

bus and 16-bit BiOS with AutoSense[®] that rush your information through the video controller to the screen.

And delivers 256 colors simultaneously in 640 x 480. Or a big 132-column

spreadsheet at a single glance.

And the VGA Professional card fits perfectly into your PC, AT* or XT* machine, as well as the PS/2 Model 30 and compatibles.

Call (415) 468-6692 and we'll tell you more about the new VGA Professional.

It's an open and shut case for better

PARADISE... Western Digital Company.

Paradise Systems, Inc., 99 South Hill Drive, Brisbane, CA 94005 (415) 468-6692.

> ICA Professional and Austreene are trademarks of Provide Systems, Inc. "BM and A" we registered trademarks, and PS-2 and XT are trademarks of internativesal Business Machines Corp.



DataCAD presents 20 basic function-key and shift-function-key commands in its main display. Construction of the 2-D year is just under way here; dimensions have also been added.



Windows and doors of any size or shape can be added to the walls of a DataCAD floor plan. Their specifications can be determined beforehand.

before trying to use it. Obviously, this is not just a simple macro facility that strings a few commands together.

DEFECULT DOCUMENTATION The manual for the 2-D environment is over 450 pages long. It explains how a CADD system could be incorporated into a manual drafting environment and discusses the differences in these two concepts. However, as a reference manual, it is difficult to use. Each command is listed with an explanation of its function, but there are no descriptions of how the commands interrelate. The index is inadeouste.

late. The index is inadequate.

Overall, Bando-CAD does not seem to streeth CADD technology. The 2-D environment is not had to use, but the manual makes it hard to find explanations of features, the 3-D modeler seems to have some nice features, but only find the manual makes them difficult to learn. The newest version of the program (Version 3.0), more manual to the control of the program of the program of the program of the models of the more manual to the models of the mo

Drawbase

No matter what kind of architectural design or draftling you have to do, Drawbease, from Skok Systems, may be the answer for you. For \$4.99 you get a very full-featured architectural engineering and construction (AEC) PC CADD package. Drawbease is designed for the professional architectural draftsman; it is not a package for the casual user who has a mixture of CADD wank to ADD was the con-

Installing Drowbare is a relatively straighforward undertaking. A rigid but logical directory structure is enforced by the install program. Andre loading 12.360K disks, you have 4.2MB less free disk. AUTOEXEC BAT files. Your provious files are given to LD extensions, and you are given the responsibility of combining the old with the new if necessary. A digitaring tablet is required, and the system don't try running the program until everything is connected and working. Utilities



High-End CADD: Summary of Features (Products listed in ascending price order)

	RoboCAD		CADvance		Micro- Station	VersaCAD Design	Cadkey	DataCAD	Arris	CADmas	Drawbase	
Entity drawing commands	\$2,000	\$2,295	\$2,795	\$2,850	\$2,995	\$2,995	\$3,195	\$3,195	\$3,850	\$3,950	\$4,995	\$5,800
Graphical entry	•	•	•	•	•	•	•	•	•	•	•	•
Keyboard entry												
Rectangular coordinates												
Absolute	•	•	•	•	•	•	•	•	•	•	•	•
Relative	•	•	•	•	•	•	•	•	•	•	•	•
Poler coordinates												
Absolute	•	•	•	•	•	•	•	•	•	•	•	•
Relative	•	•	• ,	•	•	•	U	•	•	•	•	•
Line												
Automatic polygon closing	0	•		•	•		•		•	•	•	0
Autometic continuation of Line commend		•	•	•	•	•	•	•	•	•	•	
Veriable width	•	•	•	•	•	•	•	•		•		•
Parallel lines			•	•		•						
Point				•			•	•	•	•	0	
Circle												
Center/radiue			•		•	•	•	•	•			
Center diemeter	•			•	0		•		•	•		•
3-point	•							•	•		•	•
2-point									•			
Arc												_
3-point					•	•			•			
Other					•	•			•			
Ellipse												
Multipoint curve												
Spline curve	•	•	•	•	•	•	•	•	•	•	•	•
Bezier curve	•	0		à				•				•
Rectangle			•	0.								
Polygon	20.											
Polyline		0	•			o.		0	0	•	0	
Text												-
Justification												
Center												
Left												
Right												
Auto-eligned	0	:			:							
Different fonts	•	•	•	•	•	•	•	•	•	0	•	•
Verieble espect ratio	0	101							0			
Veriable inclination angle						77						
Cen run elong erc	0	0	0	0			ō	0	ō	0	0	0
Drawing assistance					-		~				J	
Snap		_			_							
Grid												
Object								_				
Nearest												
Endpoint											•	•
Endpoint Midpoint	VV		ě.	•	•	•	•	•	•		•	•
	-74	•	D	•	•		•	•	•	•	•	•
Center of circle	•	•	0	•	•	•	•	•	•	•	•	•

Drawing assistance	RoboCAD \$2,000	FasiCAD \$2,295	CADveece \$2,795	AutoCAD \$2,850	Micro- Station \$2,995	VerseCAD Desige \$2,995	Cedkey \$3,195	DeteCAD \$3,195	Arris \$3.850	CADmes \$3,950	Drawbese \$4.995	Personal Designer S5,800
Point	•	•	•	•	•	•	•	•	•	•	•	•
Circle quadrant		•		•		•	O.	•	•	•	0	0
Intersection	•	•	•	•		•	•	•		•	•	•
One-time		•		•	0	•	0	50	•	•		•
Variable tolerance	•	•	•	•	•	•	•	•	•			•
Veriable aspect ratio	•	•		•			•		•	•		•
Orthogonal	•	•	•	•	•	•	•	•	•	•	•	•
Grid												
Variable size	•	•	•	•	•	•	•	•	•	•	•	•
Variable aspect ratio	•	•	•	•	Ø	•	•	•	•	•	-03	•
Variable engle	•			•	0			•	•	•		
Isometric	•	•		•			0			•	•	0
Editing commands												
Selection												
Objects	•	•	•	•	•	•	•	•	•	•	•	•
Groups of objects	•	•	•	•	•	•	•	•		•		
Windowa	•	•		•						•	•	•
No. of multiple windows	Unlim	8	Unim	Unlim.	8	Unilm	1	1	Unker	Unim	1	Unim
Last object		•	•	•	0	•		•	•			
By entity type		•		•	0		•	•			•	•
Erase	•	•	•	•	•	•	•	•	•	•	•	•
Unerase		•	•	•			•	•			•	
Animated movement			•	•	•	•		•		•		
Сору	•		•	•	•	•		•	•	•		
Arraye				_								
Rectangular	•				0		0			•		0
Circular	•			•						•		•
Mirror												
Rotate												
Endpoint join	•	•	0	•	•	•	•	0	D	0	•	0
Resize				•	•	•	•			•	•	•
Fill			0			0		O			•	•
Break trim		-		•			•					
Linea												
Circles/arca							•					
Other entities	ō	Ü		•	•	•		•		•	•	•
Extend	•	•	C	•	•	•	•	•	•	•	•	•
Fillet	•	•		•	•			•	•		•	
Chemier	0.	•	0	•	•	•	•	•	•	0		0
Segment line/arc		10										
Undo					0		0		0	0		



	RobeCAD		CADvance		Micro- Station	VersaCAD Design	Cedkey	DeteCAD		CADmex		
Display controls	\$2,000	\$2,295	\$2,795	\$2.850	\$2,995	\$2.995	\$3.195	\$3.295	\$3,850	\$3,950	\$4,995	\$5,800
By magnification factor	•	•	•	•	•	•	•	•	•	•	•	•
By window	•	•	•	•	•	•	•	•	•	•	•	•
Restore original view	•	•	•	•	•	•	•	•	•	•	•	•
Pan	•	•	•	•	0	•	•	•	•	•	•	•
Drag	•	•	0	•	•	0	0	0	•	•	0	0
Displays cursor coordinates	0	•	•	•	•	•	•	•	•	•	•	•
Adjustable units	•	•	•	•	•	•	•	•	•	•	•	•
Projection sids	0	0	•	•	•	•	•	•	•	•	•	•
Dimensioning	1											
Linear												
Horizontal	•	•	•	•	•	•	•	•	•	•	•	•
Vertical	•	•	•	•	•	•	•	•	•	•	•	•
At an angls	•	•	•	•	•	•	•	•	•	•	•	•
Rotated text	0	•	•	•	•	•	•	•	•	•	•	•
Beseline (stacked)	•	0	•	•	•	•	•	•	•	•	0	•
Chained	•	•	•	•	•	•	•	•	•	•	•	•
Diameter	•	•	0	•	•	0	•	•	•	•	0	•
Redius	•	0	•	•	•	0	•	•	•	•	•	•
Line terminators	•	•	•	•	•	•	•	•	•	•	•	•
User-definable	0	•	•	•	0	0	•	0	•	0	0	0
Tolerances	•	0	•	•	•	0	•	0	•	•	•	•
Leaders	•	•	0	•	•	0	•	•	•	•	•	•
Measure					_							
Distance	•	•	•	•	•	•	•	•	•	•	•	•
Area	•	•	•	•	•	•	•	•	•	•	•	•
Perimeter	•	0	0	•	•	•	•	•	•	•	•	•
Symbols												
Scale on insertion	•	•	•	•	•	•	•	•	•	•	•	•
Rotate on Insertion	•	•	•	•	•	•	•	•	•	•	•	•
Mirror on insertion	•	0	0	•	•	0	•	0	•	0	•	0
Attributes	•	0	•	•	•	0	0	•	•	•	•	•
Hatching												
Rectangles	•	•	•	•	•	•	•	•	•	•	•	•
Circles	•	•	•	•	•	•	•	•	0	•	•	•
Polygons	•	•	•	•	•	•	•	•	•	•	•	•
Curved boundaries	•	0	•	•	•	•	•	•	0	•	•	•
Around holes	•	0	•	•	•	•	•	•	•	•	•	•
User-defined patterns	0	•	•	•	•	•	0	•	•	0	0	0
Nongraphable attributes												-
Vielble/invisible	0	0	•	•	•	0	0	0	•	•	0	•
Editable	0	0	•	•	•	0	•	0	•	•	•	•
Output as text file	0	•	•	•	•	0	•	•	•	•	•	•

	RoboCAD	FestCAD	CADvence	AutoCAB	Micro- Station	VerseCAD Design	Cadkey	DataCAD	Arris	CADmex	Drawbase	Persona Designa
Help	\$2,000	\$2,295	\$2,795	\$2,850	\$2,995	\$2,995	\$3,195	\$3,195	\$3,850	\$3,950	\$4,995	\$5,800
On-screen	0	•	•	•	•	•	0	0	0	0	•	•
Context-sensitive	0	0	•	•	•	•	0	0	0	0	0	•
Disk tutorial	0	0	•	0	0	0	0	0	0	0	0	•
Plotting controls												
Variable sizing			•	•	•	•	•	•	•	•	•	•00
Plot part of drawing		0.5										
By window	0		•	•	•	•	•	•	•	•	•	•
By layer	0	O.S.	•	•	•	•	•	•	•	•	•	•
By attribute	0	0	0	0	0	0	•	•	0	•	• In-	
Automatic scaling	0	Page.	•	•	•	•	•	•	•	•	•	•
Spooling		0	•	0	•	•	0	•	•	•		
Plot flie optimization	440, 1960	0	•	•	0	•	•	0	•	•	•	•
Dot matrix plot		•	•	•	0	•	•	0	•	0	•	•
Maximum no. of:	STATE OF	947	-									
Layers	256	256	255	Union.	63	250	255	1,000	32	255	255	255
Colors	256	16	15	255	7	4,096	256	16	255	16	15	16
Pens	10	16	15	128	Union.	16	8	16	16	Unilm.	9	8
Line types	8	16	8	Union.	7	63	8	Unlim.	10	7	9	8
Hatching patterns	. 8	64	Unlim.	Unlin.	65	Unlin.	7	Unilm.	20	8	4	1
Lines per drawing	Union.	Union.	Unlin.	Union.	Unlim.	32,000	Unim.	100,000	Unlim.	Unitm.	Unlim.	32
Bytes per file	Union	Union.	Union.	Union.	Union.	4,096,000	Union.	4	Unlim.	Unilm.	Unlim.	32
Windows or views	The same of	8	10	1	8	20	1	Unlim.	1	2-D, 11; 3-D, 3	1	20
Symbol attributes	None	None	Unlin.	Unilm.	Unlin.	None	None	Unlim.	Unlim.	Unitm.	Unlim.	Unlim.
Miscellaneous features		_										
Command-line interpreter	0	•	0	•	•	•	0	0	•	0	0	•
Command scripts	0	•	•	•	•	•	0	0	•	•	•	•
Programming language	0	•	•	•	•	•	•	•	•	•	•	•
Programmable screen menus	0	•	0	•	0	•	•	0	•	•	0	•
Programmable tablet menue	0	0	•	•	•	•	•	0	•	0	•	•
Freehand sketching	•	0	0	•	•	•	•	•	•	0	•	0
Function-key support	0	•	•	•	•	•	•	•	•	0	•	•
Imports IGES	0	0	•	•	0	•	0	0	0	•	0	•
Exports IGES	0	0	•	•	0	•	0	0	0	•	0	•
Imports . DXF	•	•	•	•	0	•	•	•	•	•	•	•
Exports . DXF	•	•	•	•	0	•	•	•	•	•	•	•
Documentation												
No. of pages	461	578	900	427	761	1,000	1,050	450	842	1,604	500	1,187
Rutorial & 1500 April 174		•	•	0	•	•	•	•	•	•	•	•
Quick-start chapter	•	0	•	•	•	•	0	•	0	0	0	0
Input devices supported	_	_	_	_	_	_					_	
Mice	•	•	•	•	•	•	•	•	•	•	0	•
Graphics tablets/digitizers		•	•	•	•	•	•	•	•	•	•	•
Other	•	0	•	0	•	•	0	0	0	•	0	•

■ HIGH-END CADD



List Price: \$4,995 Requires: 286, 386, or compatible; 640K RAM; DOS 3.0 or later; 20MB or larger hard disk; math coprocessor, digitizing tablet (11 by 17

inches matimum).

In Short: A high-end architectural CADD package for detail design and drafting with built-in database management capubilities.

Designed to document the entire facilities planning process. Copy proceed.

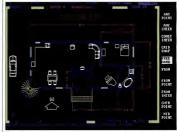
to test the tablet, display, and COM port configurations are also included.

EXPANSIVE TABLET Don't plan on starting Drawbase and leisurely browsing through the menus to learn it. With more than 500 half-inch squares sitting in front of you, the large tablet overlay is an ominous sight. The user interface is quite different from other CADD packages and is not easy to figure out. There is no quickstart tutorial, so plan on spending a significant amount of time working through the tutorial before you begin to feel confident. The tutorial, ten lessons spread out over 350 pages, steps you through the generation of a two-story office building floor plan. You won't find the exercises lacking in detail, but skipping repetitious steps is unwise because the lessons build upon each other. This dependency can lead to frustrating situations in which errors and omissions propagate themselves and cause insurmountable problems.

Creating the test gear geometry was very easy once enough settings were changed to convince the system it wasn't creating a floor plan. Drawbase uses can struction lines and circles to assist in geometry creation. This approach works well by allowing all necessary construction geometry to be easily created, overlaying the desired geometry on the construction geomtry, and then deleting all construction



Drawbase drew the test gear once it was convinced it was not doing a floor plan. Because the program is architectural in focus, dimensioning is limited to common architectural techniques.



The drawing of the floor plan was a perfect fit for Drawbase. Not only were the walls and windows a breeze to create, but the whole house could be furnished with items from the program's architectural library.

Our newest software works just like the software you're using now.



Introducing Agas a way to put yo

If you're the type of person who's too busy to read an ad, read this ad

Cover to cover. Because you'll

learn about an extraordinary new tool that will help you work, think and create better than you ever have before.

A tool that will help you manage people, projects, ideas, plans and information with incredible efficiency.

A tool that will help vou avoid slumping into your chair, shaking your head, and asking, "How will I ever get this done?" We call it Agenda",

the personal information manager.

Agenda does all the things your brain is too busy to think about.

As bright as your brain is, it's notso-terrific at storing and bringing order



20,45	Product ideas	Who	Department
Packaging	Accept packaging bills until the and of October.	• Lie	Operation
- Materials	2 Moles sure synthetic materials are reliable.	• Sue	Operations
- Research	 Have Tom break down-market research results into best case/worst case scenarios. 	• Tom	Marketing
- Distribution Westers Prioring	 Tom will have his report or by a week from Fodey, make sure it covers priorig, sweeting, distribution, and implications of service outside vendor for typesetting and printing. 	• Tom	• Marketing
- Distribution	J Do Tom and Bob think we need to	• Tom	- Marketing

Categories, How does Agenda display categories?

to lots of details and random pieces of

information Agenda allows you to dump facts,

ideas and thoughts into your PC as they come to you without having to structure the information in advance.





enda.Think of it ur mind on disk.

helps you arrange your

Flex C:\AGENDA\FI	06/21/66 TI:00			
tours	Joan	Priorey	When	
- Research	 Decision needed on nesearch budget by end of this week decises options with Jim and Joan. 	+ High	- 06/25/88	
- Competitive Tracking	Forward product comparison articles to Joan.	•Low	- 97/97/68	
boves	Dire	Priority	When	
- Distribution	 Do Tom and Bob think we need to adjust destitution min? 	+ High	• 06/20/16	
• Sonus Dollars	Bios will present iso-point incominus program at sales	• Nedure	- 06/29/04	

you want so you can understand it better.

Views. Looking at the same information through different views gives you an informed perspective.

formulate new ideas better and extract. the answers you need better.

Which means, now you can concentrate more on using your information. And less on processing it.

Welcome to our pad.

The first thing you'll notice about Agenda when you boot it up is its unintimidating "scratch" pad.

The scratch pad lets you jot down any random items of information without worrying about where to file them.

You then assign your items to categories that you create. Once you do this, Agenda will do all your filing automatically. And thanks to Agenda's multiple filing capabilities, if the information is relevant in more than one place. Agenda

And Agenda will put it in several categories at once. This makes it easy to view your items



change an item in a view. Agenda will automatically update other categories where the item has been assigned.

In fact, you could say Agenda recalculates text the way a spreadsheet program recalculates numbers.

It answers all yo important, it questio

If you're a manager, your job is all about making smart, focused decisions.

It's about establishing priorities and delegating responsibility. It's about solving problems and anticipating new ones. What a coincidence. That's Agenda's job, too. And we've prepared a situational model to demonstrate.

Don't use a toy to sell toys.
In this model, you're a

manager in a toy

company

that has to get its newest products into the important "Tons O'

Tay C - AGENCA - FILES - TRACES New Trade Show Activities - When De	(71(5)00 00:53		
Taolo	Mho	When	Function
J'Bring standard electrical sandor the booth/so Philosoph meeting.	- Par	- 000000	• Boeth Suba
 Call manufacture in this weeks to last to Torn about getting booth ready for shipment. 	• Tore	• 67719/08	- Booth Salay Shipping
Call Koreen factory a week from Truncing	+ Dave	• 07/14/03	Shipping
Talk to Kan tomorrow about mening-parpeting for the boots.	- Ken Pal	• 07/08/88	- Fernite Soom Senio

TOYS" trade

Type "Call Korean factory a week from Thursday
and Agenda's "When Dast" feature converts the
expression into a calendar dase.

show in New York. This means dealing with facility managers, shippers, booth builders, show rental managers and your staff, to name a few.

Let's arrange your Agenda categories so you can prioritize the thousands of tasks you have to address.

First, enter the tasks on your scratch pad and add a "People" category. Now, let Agenda know who's responsible for what and, voila, it automatically assigns every single project.

For example, if you named Dave as head of the shipping department, Agenda will take every-

Agenda constantly keeps you informed about detail that needs your attention. So you always

what's going on and you always have answers. And you're never caught without one of these.

ur questions. More ns all your answers.

Talk to Ken tomorrow about renting corpoling for the books.	- 10-	
	Pai	* G706/00
2 Make sure to set Pat on Thursday about raving extra sable for the booth.	- Pat Kan	-000796
the Director	100	When

You don't need to saell everything out for Agenda. I you're looking for the "Toy Display" category, type
"to" and Agenda will find a match

co-Serio	We	Men
 Out a blow-up of the whibit hall floor plan between. 	- Pat	*010
Oct Pal report the book for any damages from the traceston in Chaggo? Setter check with her first thing sunceres.	-PE	*010
 Talk to New tomorrow about renting carpeting for the bonds. 	-Ken PiE	*011
 Step by and one PE Emonte regarding new bys pine-works it include in the windox. 	- July Pg	*010
 Visio sure to set Par on Thursday about renting each battle for the burth. 	-74	*010

For example, you can look at all items due in the

One minute you might want to see which rental companies are within a ten block radius of the show Another minute you might want to know which employ-

thing you've typed in about shipping and put it in the "Dave" category.

Let's say Dave asks Judy to get an "Invincible Guy Action Figure" prototype shipped in from Korea.

Just let Agenda know, and it'll put

all the Korean shipping information in the "Judy" category, too. Agenda lets

you play with information.

The point is. you can depend on Agenda to put every piece of minutia at your fingertips.

ees are available to take over for a rep who called in sick. The next minute you might want to rearrange the toy groupings so you can make sure your big seller, "Mr. Banana Shoes," is positioned with your new "Mr. Celery Sox."

> Then. you can analyze whether vou should build a display or rent one. Call in a new employee or an experienced one.

Orwhether Mr. Banana Shoes is sitting next to the right toy or the wrong one.

did before Projects, schedules, speeches,



Agenda is for e too busy to get

Ever spend hours sifting through papers, memos and notes looking for information without actually ever getting anything done?

Do you find yourself so busy keeping track of what you're supposed to do that you don't have the time to actually do it? In this model, we're going to show you how Agenda solves all that.

Try running this shoe.

Let's pretend that you're a product manager for a huge athletic footwear company.

wear company.

Your mission, should you decide

to accept it, is to come up with a new shoe concept that will

help the company reach its

For C - CORPOR PLASE SOURCESSAN

The Comments of the Corpor of the Corpo

Agenda's category manager keeps track of your information structure as it evolves, so you can concentrate on your ideas

sales goals. You've called a meeting with the other company bigwigs to brainstorm. They have hundreds of ideas and suggestions, all seeming to have nothing to do with each other.

You can use Agenda to record and make sense of their input.

Now, let's create your categories. Let's assume "designers," "retailers" and "focus groups" are big concerns



veryone who's any work done.



To C. ADDR-FLES IMMOTION
TO C. ADDR-FLES IMMOT

Agenda can remember up to 19 macros for each file. This means you can program it to execute complex tasks with the touch of one key.

Agenda's pop-up capability makes it easy to record new ideas at anytime, even while you're using other stand-alone applications.

to everyone. As well as "projections" and even "trends."

These will serve as good titles for your categories. (But, as you know, you can create categories any way you want, any time you want. Because Agenda has been designed to file the way you file and, on a broader scale, think the way you think.)

As you start compiling bits of information on your scratch pad, Agenda will automatically put them in any number of categories where they are relevant.

Which makes working with evolving information a significantly easier task.

Interested in a relationship?

Eventually, patterns and common links will develop and you'll be

able to give structure to your random thoughts. Perhaps you'll identify a trend in trampoline shoes. Or you'll hop into the high jump market.

Instead of sitting around wondering how you're going to figure it all out, you'll be able to get right to work

Because you'll know what work needs getting to.

Kni can have on-line data from anywhere in the world fed into Agenda You'll get only the data you need because Agenda shows only the information that fits note the structure and by control



The last item on our Agenda: Call.

We could go on with many more examples of how you can use Agenda to work smarter.

We could tell you how it can help you prepare your legal briefs. Solve police work. Recruit personnel. Write speeches. Manage sales accounts. Put together business plans. Track competitive information. Develop college curriculums Organize health histories. Sort and index libraries. The list goes on and on. But we'd rather invite you to try

Agenda for yourself.

For \$15, we'll send you a demo kit that contains working software you can actually use (except you can't print or save your work). Or, if you prefer, we'll send you a VHS videotape that

> demonstrates sample applications with some examples we've cooked up.

Just call 1-800-345-1043. And ask for demo kit AEA-3058 for the 3.5" version or demo kit AEA-3053 for the 5.25" version.

Or you can ask for videotape AEA-3063.

Then you'll get to see first hand what you've already read about here:

Whatever business you're in, you're in business with Agenda.

Lotus Agenda



elements with a single command. Snap options such as Any Point, closest Intersection, Center Point, Midpoint, and Grid Point are always available through onscreen icons, and the last one chosen stays

active when appropriate.

Dimensioning options are limited to those common in architectural applications. Diameter dimensions can't be automatically generated, and features such as geometric tolerancing don't exist. The system supports five types of cross-hatching patterns with variable line type, spacing, and angles. Any closed boundary with multiple islands can be specified by either a single position inside the region or by selecting each boundary element.

Increasing the 0.5-inch dimension of the gear to 0.5625 inch in the cross-section view was performed in just two steps, thanks to the powerful Stretch Scope by Points function. To Drawbase, a scope is any polygon-enclosed region, not just a rectangle-enclosed region. By indicating a scope that encloses the geometry to be moved and by specifying the distance to move, all geometry, cross-hatching, and dimensions are automatically changed.

The same function was used again to reflect the increase in the diameter of the gear in the cross-section view. Increasing the diameter and size of the gear teeth in the front view was done by placing the entire gear into a set, excluding the inner circles, then scaling the set by a factor of 1.25. Although the dimension values were automatically updated when the associated geometry was changed, their locations weren't always changed correctly, and modifying them proved cumbersome. In some cases deleting and re-creating the dimensions was quicker.

Drawbase rose to the occasion when presented with the challenge of creating the test floor plan. Built-in menu choices such as Walls, Outside Walls, Profile Offset and Wall Opening allow double-line walls to be created quickly and efficiently. When adding a window to an existing wall, the system creates the correct opening automatically. Center and side justification options for positioning window and door openings make placing these objects a simple task. The stretch option shows its strength when walls or wall openings need moving. A symbol library with over 250

plan and elevation view architectural symbols allowed the floor plan to be fully "furnished." The symbols are indexed in a 4by 6-inch flip chart but must be retrieved by a numeric filename. However, tablet squares can be easily programmed via learn mode to recall commonly used symbols. Symbols can be rotated, mirrored, and/or scaled during retrieval.

3-D MODE *Drawbase's 3-D mode is new with Version 1.04 and is obviously still in its early stages of development. Only a wireframe mode is supported, and there is no provision for hidden-line removal. This mode does allow you to create a 3-D model by extruding and rotating ex-

 Drawbase is more than just a drafting tool. Powerful report generation capabilities that can span multiple drawings are built into the system.

isting 2-D geometry and then viewing the resulting model in three-point, two-point, or orthogonal perspective from any location. This capability is sparsely described in the reference manual, and examples of its use are not vet included in the tutorial. Shaded 3-D models with improved view-

ing options will be incorporated in Version 1.05, due out this summer.

Drawbase, as its name suggests, is more than just a drafting tool. Integrated into the system are powerful report generation capabilities. If the correct procedures are used to create a drawing, Drawbase can automatically produce an item list or bill of materials. Furthermore, objects can have attributes such as cost, color, and manufacturer associated with them, allowing functions such as counts, cost summaries, and selective queries to be performed.

Methods for semiautomatically computing the area and perimeter of floor space used are also available. The generation of reports can span multiple drawings.

The user interface of Drawbase is structured entirely around the graphics tablet. which has the advantage over other input techniques of reducing the number of levels of menus required to access a command. The disadvantage of the tablet is that it requires you to continually switch focus between the tablet and the screen. The keyboard is used only for text and numeric entry. File management operations are cumbersome-a single drawing is composed of five files, and, when filing, everything to be saved must be displayed. A file is always retrieved at a zoom scale of 1, not the last scale used. Laver names and colors are global, not drawing specific.

Assuming that you always know when you cir. Drawbase has no comprehensive undo function; the filing functions Temp Save and Temp Restore act as alternatives. The reason for the CHKDSK/F command placed in the AUTOEXEC.BAT file by the install procedure became evident when a session was terminated abnormally by a system reboot. Lost clusters totaling over 32K of space were found when the check was run. Drawbase supports the DXF format for geometry exchange and also allows attribute data to be exported to external database systems.

Drawbase is available in several configurations ranging from \$1,995 to \$4,995. The full version, Drawbase 5000, was the package tested for this review. Skok's technical support staff was very helpful, but you don't get something for nothing-support is free for the first month and is available for \$100 per month thereafter. You may need it at first, but once you become familiar with the program's vast tablet. Drawbase becomes a very strong architectural CADD system.

-Will Schleter FastCAD

In the crowded arena of PC CADD systems, FastCAD, the \$2,295 system from Evolution Computing, is one of the few programs we've seen that actually lives up to its name. FastCAD is a very fast and compact 2-D CADD package with an ex-

■ HIGH-END CADD

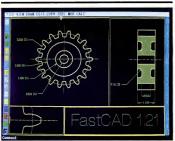


cellent user interface.

Installing FastCAD is quick and easy, bistributed on five 300k disks, toccupies a meager 800k of disk space. The install procedure loads only the files necessary for your hardware configuration. The approxime to the procedure loads of the files necessary for your hardware configuration. The other versions optimized for each processor-combination. To medify an installed driver, you must either run the installed arms of the processor combination procedure again in its entirety or use the DOS COPY command to come the poly disk, use the DOS COPY command to come the poly disk, using more than one politer.

PLEASANT SURPRISE Your first pleasant surprise will come when you type the FCAD command and the main Fast-CAD screen appears instantaneously. The layout of the screen is neat and clean, displaying a single line of pull-down menu topics across teop, a single column of icons on each side, and a single command line at the botton of the screen. If you are familiar with pull-down menus, you can be off and running immediately.

The first section of the manual describes Faut 20% features, bow to use the menus and icons, and the general concepts of entering coordinates. If this is you friest CADD system, the well-written, professionally documented set of tutorials supplied with the system are an excellent learning tool. Experienced CADD users will probably be able to use the system



FastCAD features a Microsoft Windows-like menu, with pull-down menu boxes dropping from the top line. In the lower-left corner, one tooth of the gear has been zoomed for close inspection.



A FastCAD floor plan shows the availability of a number of different line thicknesses. This feature is even handier for mechanical drafting.

If You Could Input Anything Into Your Computer Instantly, Without Using The Keyboard, Would It Make Your Life Easier?



Introducing DeskScan 2000. The affordable scanner from Chinon.

Chinon's unique new scanner could change forever the way you use your computer. With OCR software, it scans, digitizes and inputs text into your computer so that you can edit it with almost any word processing software. That means no more retyping of documents. Just think how much time that could save you and your staff!

DeskScan 2000 also scans images, so that you can input graphics too. Then you can manipulate these images with desktop publishing or graphics software.

Best of all, DeskScan 2000 is much lower priced than most effective scanners. That means it's finally costeffective to put a scanner on every PC user's desk.

DeskScan's unique overhead scanning design means that you no longer have to separate pages from documents to feed them through a scanner. The document stays still while the scanning head "reads" the page. And the unit automatically adjusts for room lighting levels.

Scanners aren't just for desktop publishing any more. DeskScan 2000 becomes an economical FAX, with the simple addition of an inexpensive add-in board. Chinon sells



this exciting option and others in package combinations of bundled hardware and software—so that you have an affordable way of getting started with your scanner right away.

So see for your-

self what DeskScan 2000 can do for you. Call TOLL FREE 1-800-441-0222 TODAY for the DeskScan 2000 dealer nearest you.



CHINON

Chinon Sells Chinon America, Inc., 660 Maple Ave., Torrance, CA 90503
CIRCLE 318 ON READER SERVICE CARD

with minimal reference to the manual. However, skimming through the tutorials is still recommended because they demonstrate several powerful features and methodologies unique to FastCAD.

It's easy to retrieve an existing drawing; just click on the Files menu, then click on the Load option, and a full directory listing appears. Click on the desired file, and the drawing appears with amazing speed. Be sure to view some of the sample drawings that come with the system. You may have to retrieve the complex ones several times before you believe the speed with which they appear.

Making sketches with FastCAD is easy; creating an accurate, fully detailed drawing is a chore that uncovers several limitations of the system. Although Fast-CAD possesses a fillet function, it allows only lines to be filleted. Thus, the fillet at the base of the test gear tooth had to be visually located. Trying to use the intersection modifier to snap to a circle/circle intersection proved fruitless, and the trim function works only with lines. Crosshatch fill can be performed only inside a polygon entity; therefore the gear cross section was outlined with regular geometry (lines and arcs), and separate polygons were created to approximate the cross-hatching boundaries. To snap to object endpoints, midpoints, or intersections requires at least two extra menu selections every time a snap is desired. Only four types of dimensions are supported: horizontal, vertical, parallel, and angular. A radial dimension command supplied as an external procedure was used to generate the diameter dimensions by first creating the radial dimension and then editing the text to get the desired result. In general, many operations in FastCAD seem to be "sketch-pad oriented"-thus making accurate drawing difficult

FastCAD's Stretch command allows for easy modification of the gear drawing as required. Everything—geometry, dimensions, and cross-hatching—is automatically changed once the modification is specified. Other editing methods supported by FastCAD include Connect, Bend, Break, and Polyedit, along with the standard Move, Rotate, Scale, and Mirror functions. Only a single level of Undo is supported.

FastCAD's support of up to four windows on the screen at a time simplified the creation of the test floor plan drawing. One small window was created as an overview window, while the major portion of the screen was used as a detail window. This allowed zooming in on portions of the drawing by selecting the zoom box in the overview window with the detail window as the current view. You can select entities or locate positions in any displayed window. The cursor, rubber-banded entities, and zoom box are dynamically displayed in all windows as appropriate. Display functions (zoom and pan), window management functions (add, delete, resize), and color, layer, and line style management functions are all icons that are always selectable, even while you are in the middle of entity creation. The speed of Fast-CAD was greatly appreciated when zooming in on the floor plan with multiple windows displayed.

STANDALONE TRANSLATORS Included with the system are translators to and from AutoCAD's DXF format. These worked without a hitch on several simple files. EasyCAD, a direct translator to/from Evolution Computing's low-end CAD, product, is also included, as are translators to/from Evolution Computing's own AS-CII exchange file format. All of the trans-

lators exist as standalone programs. Customization and expandability are definite strengths of FastCAD. Internally, the system is driven entirely by text commands. In fact, the standard menu file is just a simple ASCII text file containing FastCAD commands and can be modified at will. For automatic demonstrations, presentations, and tutorials the script file capability is great, but a learn mode for creating the script files is glaringly absent. A powerful but difficult-to-use macro facility allows even more customization. Perhaps the most powerful feature is the capability for third-party developers to add extended procedures, an assembly-language interface method for adding new commands and entities to FastCAD.

Even with its limitations, working with FastCAD is a pure joy. Its user interface is clean and consistent, and its speed of response is terrific. With these virtues, its capabilities for expansion and customization, and increased third-party support for specific applications, FastCAD has the potential to become a major force in the PC CADD market.—Will Schleter

MicroStation

Intergraph Corp. is one of the best-known names in the turnkey minicomputer business. Its CADD workstation products, costing well into five figures, are the life-blood of big corporate design work. To discover that Intergraph markets Micro-Station, a product for the PC, is exciting, According to some estimates, Micro-Station has 80 percent of the functions found in Intergraph's bis-ticket workstations.

MicroStation was not designed by Integraph, but by Bentley Systems, of which Integraph owns half and has exclusive distribution rights. The important point is that MicroStation was designed from the start to emulate Intergraph's turnkey systems, with the result that you get feature-rich drafting functionality that approaches that of systems costing ten times as much.

Many of us have had the experience of learning a new software package and resizing, perhaps after a considerable length of lime, that we have finally become productive in the use of the software. This productivity comes both from an intimate knowledge of the package and from the extent of the capabilities of the software. Min-ros/Statine focuses on productivity, ome a





High Tech Insurance

With Everex tape backup products, users of IBM* DC'/XT'/ATs*, compatibles or PS/2s* can insure that the valuable information stored on their system hard disks is never lost. A variety of options are available including 40MB to 125MB capacity in cartridge, cassette or mini-cartridge drives—all at affordable prices.

Everex has been an industry leader since 1984, providing a variety of tupe backup systems to meet your data security needs, Our external tape units are perfectly suited for sharing among several users because they can be easily transported from desk to desk. The popular half-height, internal units are designed to fit inside 5 1/4-inch disk drive slots. There's even a mini-cartridge drive that fits right used a disk drive slot and runs off an existing floppy controller.

With Everex tape systems, you have the flexibility to save or restore all information on your hard disk, including DOS and all other operating systems. Backup can be done file-by-file or as an entire miror image, and you can restore individual files from image backups. You can also backup and restore data over Novell networks, including bindery and trustee files that contain Novell network security information. If you have an assortment of PC/XT/ATs, compatibles and PS/2s, you can cut down on your backup costs by using one Everex tape backup unit. Just put a special controller card in each computer and share the tape unit among them.

When you buy an Everex tape backup system you get everything you need including manuals, software, blank tape, a cable and a controller card. This isn't true with other tape units on the market today—their extra costs can add as much as \$250 to a system.

When it comes to insuring your data, it's easy to see why Everex has the answer.

For more information or the name of your nearest Everex dealer please call:

in USA 1-800-821-0806 in Calif. 1-800-821-0807

VEREX

415-495-1111 45431 Milmost Drive Framont CA 94538

EVERTA a maximum and EVERT decision as regiment reduced of Everta Types on the All symmetry and PC 97 and PC 17 and PC 18 and 18 are required to the All symmetry and the All sym





You've known Genoa as a developer of high performance graphics chips, and a leading manufacturer of graphics boards and tape backup. Soon you'll be able to depend on us for all your PC graphics add-on hardware.

Over the next year, we'll be unwrapping a series of graphics products. Each is designed to give you the most reliable, yet innovative engineering features. And above all, the highest performance possible.

possorie.

Our SuperVCA HiPles tamily, featured bere, at the first in our new productiseries, and the first in our new productiseries, out of the first in our new productiseries out of and resolution. From 16 colons in 1024-788. Up to 256 colors in 800x600. Novil 15ee more of your spreadsheet is once with SuperVGA HiPles 132 columns and 60 rows Novil 16 of Windows or OSIZ. In fact, every SuperVGA HiPles Heature is designed to turn your IBM PCX/T/Al' and PSIZ models 25 and 30 into real graphics engines.

Delivering SuperVGA HiRes now!



- 100% IBM VGA compatible Advanced features
- -1024x768 in 16 colors and 800x600 in 256 colors/Model 5200 -512x512 in 256 colors/Model 5100
- 132 columns text For both analog and TTL displays

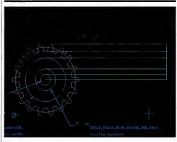
If you're looking for PC graphics add-ons, take a look at Genoa first. Our new line of products is starting delivery now!

For the Genoa dealer nearest you or to add your name to our mailing you rot not your name to our mailing ist contact: Genoa Systems Corporation, 72 E Timble Road, San, Joss, CA, 95131. Fax: 408/434-40997. Telev: 172319. Or phone: 408/432-9090 in the UK contact Genoa Systems Limited, phone: 10:225-3247. In the Far East, contact Genoa Taiwan, phone: 2-776-3933.



Delivering PC Graphics

408/432-9090



To make drawing the section view of the gear easier, MicroStation projected construction lines in from the right to act as guidelines while the shape was being formed.



With MicroStation, all dimensions can appear in all views. Here, two of the three dimension sets are turned off in three of the views, but dimensions for both the front and side views are displayed in the upper-right isometric view.

user is intimate with its commands and structures, he can expect a level of productivity that may not be achievable even with the venerable AutoCAD.

The downside of this power is the extremely steep learning curve required. Where most CADD packages are now using some sort of pull-down menu or pointand-click methodology, MicroStation presents you with a basically empty screen. At first the empty screen is intimidating: there are no indications of what to do. Later, you come to appreciate MicroStation's clean style. The clear screen gives you room to do the business at hand: drawing. But if you don't know the commands you want to execute, you are in for a long session of searching through the manuals or resorting to such techniques as keeping scratch-pad notes of useful commands. In our case, learning it required a diligent search through the manuals (it took several hours) to figure out how to place a "tentative" point that would snap to the endpoint of another entity. (How? By pressing both mouse buttons simultaneously.)

In fairness to MicroSaulion, the program is designed to work with a digitzing tablet, even though a mouse is supported. This is frequently the case with CADD software either the software works best with a mouse but can accept a digitzing tablet, or it is most productive with a digitzing tablet and barely lokerates a mouse. MicroSaulion is decidedly situated in the second category. A digitzing tablet is essential for the simplification of finding and executing commands.

TERSE DOCUMENTATION If we want as transport incision of Mirrodustion, it is in its documentation. The reference manual is tere, to put it politicly, and the index isn't much more than an alphabetized list of commands. If you know the command you're looking for, great, but if you don't, it is time for a marathom page-turning session. The 21 pages in the chapture of the purpose of the properties of the prop

Technical support for MicroStation from Bentley Systems is excellent. The people we talked to were friendly, knowledgeable, and frank. In response to our



SORRY, BUT THE NEXT *J*AIABASF IN IULY.

Whether voure a novice or an expert, R:BASE is now your best choice for orderentry and inventory control, personnel and payroll or any other database applica-

tion, large or small. But you don't have to take our word for that-

It combines the ease of use a novice requires with the sophistication and power a professional demands. R. BASE for DOS is clearly the best general-trurtose PC DBMS available today."

NORODY LIKES

DOING THINGS

THE HARD WAY.

So R:BASE uses its

to let you do everything.

advanced technology

even create complete

applications, without

DC Week

learning any commands.

Screens, forms and reports are all laid out visually, so what you see is what you get.

For data management on the fly, R:BASE uses PBE (Prompt By Example) instead of QBE (Query By Example) because queries aren't all you need to do, Just select tasks and R:BASE does them, helping you with menus, prompts and on-line help.

To automate your database needs, you can record all your keystrokes in the interactive mode. then play them back later.

Or use our second-generation application generator to quickly and easily create user-friendly

We're talking about the DBMS you've been hearing about. The PC database management

system that "leapfroos into the next generation," the "most powerful, easiest to use DBMS ever made for a PC."

But it's not the PC database system that may ship at the end of July, It's here, Now.

MEET THE NEW DBMS STANDARD.

WYSIWYG screens forms and reports.

You'll have to see it to believe it.

Meet R-BASE®



IF YOU DON'T WANT TO READ ALL THAT

READ THIS Easy-to-use Prompt-By-Example (PBE) does overything because queries (QBE) aren't all you need to do. WYSIWYG screens, forms and reports.

Automatic applications for novices and quick prototypes for power users with no programming, no commands. Really easy SQL that even novices can use with menus, prompts and on-line help.

LAN's are free for up to 3 users, with full concurrency control down to the item level Real OS/2 means that R-BASE is the only PC DBMS that gives you multi-tasking, automatic caching, etc. Share micro data by importing/exporting dBASE.** Lotus.**

Multiplan,* ASCII files or import from pfs.file* and Share mainframe data from SQL/DS, Ramis II, SAS, etc. through Lotus' The Application Connection*

Companion products include: network six-pack and mited LAN versions: runtime: business graphics: Program Interface to C. Pascal and FORTRAN: English as a query language

IT'S SHIPPING NOW:

applications without learning a single command or writing a single line of program code.

IS R:BASE FAST? IT SCREAMS!

We rewrote R:BASE in C and optimized it for speed.

Then made it smarter, so database operations like SORT VIEW and CROSSTAB are up to 20 times faster because R:BASE automatically chooses the fastest way to get the infor-

mation you need. And our built-in intermediate code compiler adds another giant burst of speed. MORE POWER

THAN YOU MAY EVER NEED.

With no programming, novices and experts can quickly and easily include advanced features like data validation. Computed values and conditions, Look-up capabilities. Even relational links for order-entry or invoicing sys-

tems so that data is entered into or retrieved from multiple files. Or you can work directly with R:BASE's extensive programming language, or easily build on the code produced by our application generator.

R:BASE supports up to 80 tables (data files) in a database. Provides scores of scientific and business functions, powerful commands. password protection and keyboard macros. Has a really easy to use SOL that can be used with menus, in command

mode, or embedded in custom programs. Includes an intermediate-code compiler that generates fast, efficient code. Offers a runtime

package. And more.

LAN'S, OS/2" AND A WHOLE LOT MORE. R:BASE for DOS

comes out of the box with support for up to 3 LAN users (more available), with concurrency control

down to the item level, And R:BASE for OS/2 has the same features and facilities with the added bonus of multi-tasking—so anyone can do several things at once-and even faster performance.

EXPRESSIVA to Information

System for a single

ide or so is the

With all this, R:BASE for DOS (1-3 users) is just \$725: R:BASE for OS/2 (multi-tasking) is \$895. Check it out with your nearest dealer or contact: Microrim, Inc., P.O. Box 97022. Redmond WA 98073.

What are you waiting for? Call 1-800-624-0810 today.

R:BASE From Microrim

From Alaska and Canada, call 1-206-867-1800. Department PCM888. Microrim and R. BASE are trademarks of Microrim, Inc. Other products and services mentioned are not. @Microrim 1988 CIRCLE 176 ON READER SERVICE CARD

criticism of the documentation and the stark user interface, the Bentley representatives described Version 3.0, which will be available by late summer. Version 3.0 will include features lacking in the curve version, including pull-down menus and expanded documentation. Meanwhite, Bentley offers a host of programs that can be used to enhance. MeroSation, many at no charge. Many can be retrieved from the Bentley Bulletin Board.

Documentation and learning curves aside, MicroStation has enough features to keep even the most demanding draftsman happy. Up to eight views of a drawing are supported; these are user definable and can be named. On a one-monitor system, four of the views are on a virtual screen, hidden from view. On command, the contents of the virtual and visible screens can be swapped. On a two-monitor system, all eight views are constantly visible. You can draw "fences" around parts of the drawing and then copy, mirror, rotate, plot, manipulate attributes, and so forth within the fence. The flexibility of the fencing makes this a powerful feature.

POWERFUL COMMANDS: A host of user-definable Lock commands are available—Axis Lock, Snap Lock, Level Lock, and so on. The Lock and Fence commands were extremely useful in drawing the test gear. MicroStation has a powlar to the companies of the commands of the late compiles clements compile celements are a series of attached line elements that are a series of attached line elements that are connected together into one and can be filled with cross-batching, have its area cachulated, and so commands of the cachulated. And so cachulated and so cachulated and so cachulated and so cachulated. And so cachulated and s

As you would expect in a package this powerful, a programming language is supported. In addition, an interface with MRASE III is supported. Programs to query the database for all the occurrences of a door symbol, for example, can be written. Text can be imported from an ASCII text life, giving you the ability to use a word processor to type up assembly instructions and then import them onto the frawine.

One drawing can be used as a reference file for another. In a way similar to placing a reference drawing on a drawing board with an overlay on top of it, you can trace the reference drawing and pult portions into the active drawing. The reference file is dynamic; if it is updated, the updates will be visible each time the reference drawing is called up.

MicroStation is what is known as a "obust" package. Drawings are uplacted disk as you work. Most software updates only RAM and later updates the disk on a Save command, losing the updates if there is a power outgebe before the drawing is saved. This is not a problem with Micro Station. Note that since deletes occur on the disk, the benchmark-test block delete time for MicroStation includes update the disk file, making its speed even more impressive.

■ Companies with an eye to the future may want to start on a PC with MicroStation and later move up to a turnkey minicomputer.

Intergraph is one of the remaining ventors that still use a hardware lock. The disks are not copy protected, so backup copies can be made. Merzokarion will run without the lock, but only in demo mode. The people at Bentley Systems told us that some users make use of this feature by starting a plot on a computer without the hardware lock while they continue work but the start was to lock while they continue work but the start was to be sufficient to the start was to be sufficient to the start was to be sufficient to the sufficient mode will not about mickommand, the plot finishes before the lockless machine buts down.

3-D MODELING The 3-D features of MicroStation are extremely well conceived and powerful. Many of the 2-D commands are consistent with their 3-D complementation, hence the learning curve to get into 3-D drawing is much less steep to get with their 3-D will be seen to see the seen of the seen of

one view is reflected in the rest. This is the way a 3-D CADD package should work. Surprisingly, hidden-line removal, crosssections, and shading are not supported by

this MicroStation feature. Who would be willing to spring for the \$2,995 price tag of MicroStation? Certainly users already familiar with Intergraph's products who want to add CADD workstations at one-tenth of the cost. Also, companies with an eye to the future may recognize that they can start on a PC with MicroStation and move up to a turnkey minicomputer and bring their valuable expertise and drawings along with them. (MicroStation supports a file transfer facility to other Intergraph systems but does not support import or export to DXF file formats; DXF file transfers will be supported in Version 3.0.)

Because of its huge range of features and commands, MicroStation will also be attractive to customers who purchase it solely on its own merits. Such customers must recognize the amount of learning they will have to undertake will have to undertake to undertake will be paid off with a CADD package that at the second of the property of the paid off with a CADD package that are to provide the paid off Martin L. Ramset and the package that are the package that the package t

Personal Designer

Computervision Corp. S Personal Designer is a 3-D wireframe mechanical design and drafting program modeled after CADDS 4X. Computervision's traditional mainframe-based turnkey CADD system. An additional module, Personal Designer Surfaces, adds 3-D surface modeling, shading, and rendering.

There are two main reasons why you would spend over \$9.000 for this fully out-fitted system (\$5,800 for Personal Designer, \$2,820 for Springer, and \$1,000 for Personal Designer, \$2,820 f

Recently Computervision was pur-

Rated #1 business graphics package second consecutive year. – Softwore Digest

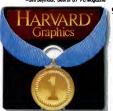


"They (Harvard Graphics)...made the best even better."

-Jim Seymour, "Best of '87" PC Magazine



"Product of the Year"-Infoworld 1988



Winner 1988 Personal Computing Graphics Challenge

Award Winning Performance.

There are a number of prestigious | honors in the graphics business. But only one program has captured them all. Harvard Graphics.

Harvard's flexibility, ease of use, and high quality output make it the unanimous choice of the nation's leading software evaluators. We couldn't be more honored. But Harvard isn't resting on its laurels. New Harvard Graphics 2.1 adds a unique spelling checker, over 200 new symbols, improved editing capabilities and more.

There's one more recommendation we'd like to have. Yours. Call for a free trial disk and

Graduate to New Harvard Graphics 2.1 with Spelling Checker.

For a free trial disk call 1-800-345-2888, Operator 53. For upgrade information call 1-800-255-5550.

let Harvard Graphics demonstrate ils withning form.

HARVARD

Graphics

HIGH-END CADD



Performance Tests: High-End CADD

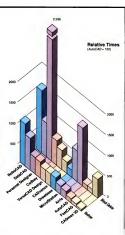
Our performance tests measure the time it takes for these capackages to perform two frequently used CADD functions: screen redraw and deletion. They also record the size of a typical file. We performed the tests on an 8-MHz IBM PC AT with a standard 30MB hard falsk drive and an 80287 math corposessor:

Performance Times (Times given in seconds)

	(Kbytes)	Redraw	Block Delete
RoboCAD	N/A	26.5	16.5
DataCAD	147	20.0	9.0
Personal Designer	47	10.5	323
Cadkey	43	10.3	6.5
VersaCAD Design	39	8.0	5.0
CADvance	24	8.0	3.0
Drawbase	12	8.0	2.0
MicroStation	89	5.4	82
Arris*	18	4.6	15.4
AutoCAD	49	2.6	1.1
FastCAD	11	2.0	1.2
CADmax 3D	132	1.1	5.0

Ni A—Not applicable: due to the program's unique file handling scheme which breaks files into shapes and stores the shapes by category, the file eize is unreportable.

*Arris was fielted under Xenix, its neturel operating environment. An Intel Above/board with 4M/0 of memory and a VMI video adapter board were also required.



We measured the File Sites for the full feet by tan entity entry. These sites ranged from 1 K to 1 KT. A muster was made in the site of the full file of the fu

The Redraw test measures the time it takes to redrathe full errey on the screen by zooming to a full page view and centering the eney on the page. The results ranged from 1.1 to 25.5 seconds, and the everage times 6.9 seconds.



The Block Delete test messures the time it takes to delete the bottom held of the entry using a single blockdelete operation. We did not include the time states to select the block "Though AutoCAD and FastCAD were the fastest, credit also goes to Drawbose, which creates to own chipf files for Insoperity used sunctions. These files result in feels execution of heavy used to files result in feels execution of heavy used to the property of the property of the property of the time to the property of the property of the time to the property of the property of the time to the property of the time time to the time time time to the property of the time t

A portion of the drawing used for our testa is reproduced on the left it consists of a ten-by-ten-array of entities Each entity consists of a square that contents an incribed direle with another aquere inscribed impide it. Each entity is separated from the others on all sides by 1/4 inch.







most compatible graphics tablet you can buy.

SummaSketch is the world's best selling tablet because it's filled with "Plus's". Like full IBM connectivity with the PC, AT and PS/2. Plus full Microsoft® compatibility through a Universal Mouse Emulator™. Plus a separate tablet driver for Microsoft Windows. Plus a two-year warranty. Add that to our standard features - like high resolution and accuracy with the most software compatibility - and you have the tablet with all the Plus's. The 12" x 12" SummaSketch Plus. New 18" x 12"Version. Now you can get all these great features in













CAM

CT 06430 · 203-384-1344

ls software compatibility with AutoSketch and hundreds of other programs.	SEND ME ALL THE PLUS Send me more information on the AutoEASE template offer and on SummaSketch tablets.
	Type of industry:
a:]	Type of application:

'm interested in OEM informa Title

magraphics Corpora Fairfield, CT 06430 PC 8/88

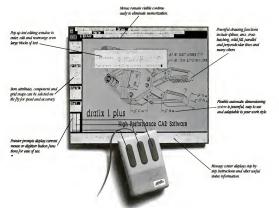
CIM Tablet Driver allows operation under Microsoft® Windows environment, PageMaker®



and Windows Draw







Drafix. The easy way to become a sophisticated CAD user.

Some CAD packages give you powerful features. Others promise ease of use.

Only one gives you both. Drafix. High performance CAD you'll be using

in minutes.
Draftx features a unique menuing system that

was created to work with, not against the way you design. All the menus are visible all of the time,

options are automatically displayed, everything is smooth, natural, easy to use. In minutes wou'll be able to create sketches:

in minutes you'll be able to create sketches and drawings that would take weeks to learn on any other CAD system. High performance CAD you'll be using for years.

for years.

At the same time Draftx offers all of the drawing, designing and editing functions demanded by the most serious users such as architects

and engineers.

Text editing window, function key macros, splines, automatic dimensioning — Draftx delivers the full function CAD power only found on the most sophisticated systems, at a fraction

of their cost.

A complete CAD Package, Only \$295.

A complete CAD Package, Only \$295.
Your Drafts package is complete and ready to run. There's no need for the expensive add-on modules that cheaper rackages require.

Drafix even includes both Dot Plotter (for high resolution output on over 100 dot matrix and laser printers) and our library of 450 time saving pre-drawn symbols.

e-drawn symbols.

And if you need 3-dimensional drawing canabilities, try our new

drawing capabilities, try our new 3-D Modeler, the 3-D CAD package designated Editor's Choice by PC Magazine. Draftx. The CAD package you'll

be using in minutes. And using for years. Call for the name of your local Draftx dealer

Call for the name of your local Drafix dealer or place your Toll-Free order today! 1-800-231-8574 ext. 550

in Mission and (816) 891-1040
Ask about our 3-D Modeler, AutoCad File
Exchange, Professional Symbols Libraries and

Atari ST version.
FORESIGHT

CIRCLE 192 ON READER SERVICE CARD

■ HIGH-END CADD





Version 3.01 Computervision Corp. 100 Crosby Dr. Bedford, MA 01730 (617) 275-1800 List Price: \$5,800; Surfaces, \$2,800: User Pro-

ing Language, \$500; Finite Element Modeler, \$1,500; Finite Element Modeler-PLUS (includes MSC-PAL), \$3,450: IGES translator, \$1,300: DXF Translator, \$1,000: CADDS 4X Direct Translator plus third-party programs, \$1,200.

Requires: 286, 386, or compatible: 520K RAM; DOS 2.0 or later; math coprocessor. In Short: Personal Designer has a steep learning curve, but taking the time to study it pays off for anyone who needs an excellent mechanical drafting capability. Architectural features are not emphasized. Copy protected.

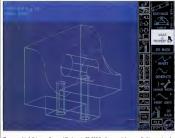
chased by Prime Computer. Prime, one of the top-ten big CADD firms, has also purchased VersaCAD; the combined firm is by far the largest seller of CADD systems in the industry, with the largest installed user base to work from. VersaCAD and Personal Designer will continue to be marketed and enhanced as separate products.

NEW CODE When Computervision decided to enter the PC market, the company determined that it would be much better off writing code from scratch rather than trying to port and squeeze 10 years of code into the PC box. Personal Designer was written using a database structure that facilitated transfer of information bidirectionally between it and CADDS 4X, although it does need to use a translator to go between systems. The syntax, command structure, menus, and so on are all set up so that a CADDS 4X user peeds no additional training to switch to Personal Designer (or vice versa).

The installation procedure is semiautomated. It saves and renames your existing AUTOEXEC. BAT and CONFIG. SYS files, then modifies a copy so that you can reboot and start up the system with the adjusted parameters. A device driver



Like AutoCAD, Personal Designer has totally associative dimensioning, making the resizing of an object like the gear an easy operation. Cross-hatching is available only as lines; the program does not offer patterns.



To create this 3-D image, Personal Designer's \$2,800 Surfaces module was called into action. It was needed to draw the intersecting curved surfaces of the object.

■ HIGH-END CADD

(CVBOX.SYS) is installed into the CON-FIG. SYS file. I had no problems installing the system on drive D: instead of drive C and the system was quite flexible in the location of all the support directories. There are two quirks to the system: its handling of graphics device drivers, and the security device encoding system. You must have the device drivers disk in drive A: to install or change a driver-I don't understand why Computervision hasn't given users the option of storing the drivers on disk. And be sure that you have your dealer encode your security device for you. It plugs into a parallel port. The process is involved, requiring a call to Computervision for authorization, and it can be quite frustrating. Your dealer should be able to do

that for you Once you load the software, you have to configure the devices and compile the on-screen menus to adjust for the graphics board installed (an hour-long process on a 286, 20 to 30 minutes on a 386), and you are ready to roll.

LISER INTERFACE. The basic screen design is simple: a command bar across the top and a screen menu along one side. The menu is interactive and graphic. Choose an item off the screen menu, and a command will be issued or another graphics menu will appear. Experienced users of Personal Designer who use 286-based systems will probably decide to turn the on-screen menus off (they can be turned on or off at any time interactively, freeing up more drawing area), as they can be quite sluggish. The on-screen menu system is actually an editable drawing, so the system must access that drawing every time it is required to show a new graphics submenu. Menu response is greatly enhanced by specialized graphics boards or by running the system (and menu drawing) out of a RAMdisk. On a high-resolution 386 system. however, the on-screen graphics menus really do shine, and the response seems instantaneous. In that case, the menus really do help the new or occasional user both to operate the system and to become familiar with its syntax. You can completely restructure and reorient the system in just about any way you want; you can construct Create menu boxes surrounding the drawing area like those of FastCAD, set up

menu/submenu systems similar to CADvance's, or even re-create AutoCAD's pull-down/pop-up menu system.

The tablet system has the same type of flexibility and allows you to modify or reassign selections on the fly. As shipped, the tablet menu is configured to the needs of a new user, and as you evolve into a more sophisticated user, you can have the tablet evolve with you.

SYNTAX New users are more intimidated by the syntax of a CADD system than by any other aspect, and Personal Designer's is among the most scary. It's designed to provide comprehensive flexibility in the creation and manipulation of graphics enti-

 Personal Designer is definitely a mechanical drafting package geared to the daily user. The methods of selection are oriented to those who memorize the functions.

ties for users dedicated to getting as much productivity out of the system as possible.

Commands are composed of two sections. The first half of a command describes what you want to do and is structured "Verb-Noun-Modifiers": For example, to draw a green line parallel to an existing line offset by 3 inches to one side, the command is "INS LIN COLO 2 PRL DIST 3:" where the verb (what you are going to do) is INSert, the noun that the verb is acting on is LINe, and the modifiers are COLOr 2 (green-only required when different from current default color), PaRal-Lel. DISTance 3 (default units).

The second half of the command is the selection process, in which you select the entities the command should act on and where it should occur. In our example, we are prompted (although the prompts are cryptic) to select a line to offset from, then select where to start and end the line. If that is all you want to do, great-just hit Return. But if you want to select another line and use different parameters, things get a little more tangled. A complex example of an entire command may look like this:

INS LIN COLO 2: dig dddORG d;dig dd INTOF dd:PRL DIST 1:lin ddig ON dEND d

You can see the complexity of the system in this example. What you may not be able to see is the power that this syntax can generate once you learn how to use it.

CONSTRUCTION Personal Designer is not meant to be used for drawing buildings; this is definitely a mechanical drafting package. You can create line fonts with the program, but only six are available at one time. There is no rectangular array command, and though the system supports both cubic and Bezier splines, the cubic splines are made of vectors. Bezier curves can be manipulated by their control points. The system is single-precision floatingpoint, accurate to seven decimal places. A full-screen pop-up text editor is included, and ASCII text files can be imported to it.

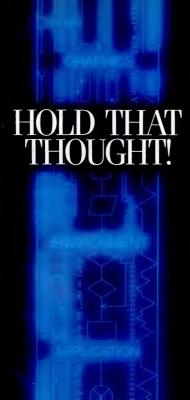
To construct the 3-D test image, the Personal Designer Surfaces module was needed to draw the intersecting curved sur-

Orthographic projections are extremely easy with Personal Designer, once you understand how the system works. The system can generate multiple views, called Auxiliary Views, on a single screen, but this feature can be quite confusing when you are first trying to learn it

The dimensioning system is quite complete. All the dimensioning is totally associative-and, surprisingly, so is the crosshatching. It is unfortunate, though, that the cross-hatching consists only of lines and not patterns. Resizing and stretching the test drawing of the gear was a very trivial task with this system.

With Personal Designer, any entity can be assigned to only one group, and selection of any entity in a group automatically selects all members of that group. Groups are therefore like temporary local sym-

These symbols can be nested only one



niversal Vectors Corporation defines a new level of data protection with UNISAVER (patent pending).

This new, unique product "hibernates a slice of your PC's intelligence" instantly, by capturing the exact and entire state of your PC:

- · When disaster strikes · When you need to leave
- your system running unattended · When you want to "Iso-
- iate intelligence" for security reasons
- · When you're called to a

· When someone needs your PC for a "rush" job. UNISAVER "saves your place" on a 1-megabyte. high-speed, non-voiatile RAM board that fits into one of your PC expansion slots. UNISAVER will automatically start your operation back up at the precise point of interruption. UNI-SAVER eliminates the fear of unattended operations.



UNISAVER is a bold departure from power back-up systems because only UNISAVER does the "thinking" for you. By providing "real time" coverage of data, UNISAVER fills the gap jeft, by archivai back-up in the protection of "live" data

Call George Wheelock at Universal Vectors for a brochure or demonstration of this truly unique product.



CIRCLE 295 ON READER SERVICE CARD

layer deep—something you have to watch out for when translating drawings from other sources. The test drawings—from (ICES and DXF—were not translated property, specifically because of this incompanies of the property of th

Symbols are stored external to the drawings. If you want to move a drawing from one system to another on floppy disk, you must also bring along the associated symbols. CADvance, used to have this problem, but fixed it in Version 2.0.

MACROS AND PROGRAMMING As you would export, Personal Design programming capabilities are quite extensive. A complete programming language is included, with direct access to the classbase itself, but note to compile the programs you must purchase the Personal Designer User Programming Language, which is really just the compiler. (If you have several systems, you should be to get by with one compiler if you do all your compiling on that machine.)

The documentation is generally very good. All the information is professionally presented, ample in scope, and quite useful. The reference manual is well written

and well indexed.

Personal Designer is definitely geared to the daily user. The prompts and methods of selection are oriented to those who use the program enough to memorize the various functions. The occasional user may not always remember the best way to go about a particular function, but on-line help is available.

If at any time you are not sure of your options, enter a question mark and you will soe a list of all valid options. If that still isn't good enough, hit an exclamation point and you will get a full-page summary of what those options mean.

Though Personal Designer is missing a few features that would enhance its usefulness (like mixed units of measurement in its coordinate dimensioning), the program

remains among the most powerful mechanical drafting packages available, and the more than 30 companies writing thirdparty add-ons seem to agree. The learning curve is steep indeed, but in this case, taking the time to learn the program pays off.—W. Bradley Holtz

RoboCAD

nal edge.

Robo Systems Corp. makes versions of its Robo-CaD CaDD package for both PC compatibles and the Apple II series. Apple uses traditionally expect a high degree of sophistication in the user interface of the software they purchase, and Robo stems' experience in the Apple arena is spongered in the Popular Apple Apple arena is spongered in the Popular Robo-CaD discovered in the Apple arena is spongered in the Popular Robo-CaD discovered in the Apple arena is spongered in the Popular Robo-CaD discovered in the Apple arena is spongered in the Popular Robo-CaD discovered in the Apple arena is spongered in t

To draw an arc, for example, it is not necessary to type an Arc command, or for you to select Arc from a nested hierarchy of menus. Instead, you need only click on an actual picture of an arc. The advantages of this approach are obvious—the visual feedback makes it easier for you to choose the right drawing element. In addition, the con of the Arc shows the order in which the points are to be positioned—exente first, then radius on starting edge, then first particular the results of the

ICON CONCEPT This icon concept is taken quite deep into the software—you set snap grids by pointing to a picture of the kind of snap grid you want. Selecting items for deletion involves pointing to a picture of the kind of deletion you want to make: whole items, partial items, anything within the box, and so on.

Robo-CAD also uses pull-down mems, selection paleties, and dialog boxes to asist you further. Most of the commands and he mixed (the term is "nonmod-at")—you can be in the middle of an Ensac command and decide to pull down the View mems to Zoom In closer before remaing to the Ense palette box, which is still on the screen. In fact, the drawing area m become quite litered with boxes, but Robe-CAD allows you to pick them up and the part of the properties of th

all dialog boxes and menus invisible.

The difficulty with RoboCAD is that the user interface can sometimes get in the way and can limit productivity by its very presence. Constantly responding to dialog boxes can become tedious once you are up to speed, and the time required to redraw the icons and menus seems to make the software a sluggish performer. It also seems that in the attempt to use icons throughout, the Robo Systems people have stretched a good thing a little too far. Is it really possible to design meaningful icons for the multitudinous ways that dimensions can be created? In the long run, the answer seems to be yes, but until you digest their intended meaning, you'll be glad to have the manual to help interpret the funny little pictures that pop up all over the screen.

While the interface enables, yet to we RoboCAD productively in a minimum anount of time, real power users will feel camped by some of its limitation camped by some of its limitation we were hampered by the program's lack or as underlied the control of the control of

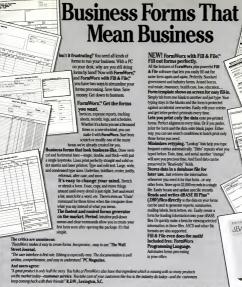


RoboCAD4 RoboCAD, Version 4.1A Robo Systems Corp 3000 Cabbo Blvd. West, #150W Langhome, PA 190 (215) 750-6590

3000 Cabbos Blvd. West, #150 Pip. 19047 (215) 750-660-600. Requires: 286, 386, or compatible: 640K. RAM; DOS 3 or later: RoboSOLID requires math opprocessing the state of the

package that has an icon-driven user interface for ease of learning and ease of use. Not copy protected.

CHELE 475 ON READER SERVICE CAPD



typed before. Date, time, and serial number "stamps

other form. Store up to 32,000 records in a single (LDBF) files directly so the data on your forms

mailing labels, form letters, etc. Easily create a form for loading information into your dBASE. files. Or quickly make a form for viewing selected

JBASE III PLL

1-800-992-0085 In Mass 617-890-4499

FormWorx 1 4 1

CORPORATION Reservoir Place, 1601 Trapelo Road, Waltham, MA 02154

CIRCLE 174 ON READER SERVICE CARD

						_
Special	Offer! FormW	form is just \$95." It	FormWork with	h Fill & File is j	ast 8149.* Each p	ackag
none						,

support.		manual with tutorials, and FREE telephon orx with Fill & File
		☐ Enclosed is my check or money ord
Card no.	Expires _	 Make checks payable to FormWorx Corp. Stirming and Handling in 1% Canada

FormWorx-54 75, FormWorx with FER & File-\$6.75 Air mail overseas: FormWorz-\$30 FormWorx with Fill & File-\$28 to MA add 5% sales tax. 45-Day Money Back Guarantee! If for any mason you are not satisfied.

call our customer service department to arrange for a prompt refund. Direct numbases only

PCM8/88



The most powerful hard disk ever released.

Introducing Passport from Plus. The portable hard disk. If your PC users need removable mass storage, they've had to give up a lot. That's because until now, removable storage made you settle for low capacity. Lackluster

performance. And questionable

reliability.

But now, there's a powerful removable hard disk with no compromises. Plus Passport." It comes from the same people who developed Hardcard."

What makes Plus Passport different than all the rest is its performance. It gives you 40

or 20 Mb of capacity. Along with an effective access time of 28ms. Which is as fast as the 286/386 class fixed hard disks.

With proven Winchester technology and 60,000 hour MTBF, it's three to five times more reliable than most other drives, removable or not.

As a result, it's easy to make Passport your primary mass storage device. For any PC. Whether it's a PC/XT"/AT class computer, or the IBM' PS/2" Micro Channel System.

Passport can be installed next to your floppy disk drive, or in



a free-standing external chassis.
Either way, the Passport hard disk can be

Passport hard disk can be removed in seconds. Which makes data easy to secure. And easy to transport.

You can even put it in a briefcase and take your data from one computer to the next. Anywhere in the world. Passport can withstand up to 150 Gs of shock which makes it one of the most durable hard disks ever built.

When you put it all

together, Passport gives you a powerful way to improve both security and productivity. Call the Plus Product Support Line at 1-800-826-8022. Well send you a brochure, ree, explaining what makes Plus Passport the most powerful hard disk ever released.

Plus

CIRCLE 164 ON READER SERVICE CARD

■ HIGH-END CADD



RoboCAD lets the user move its warious pop-up memus to any location on the screen. If you click the mouse on the RoboCAD logo, all the menus and dialog boxes will temporarily disappear from the screen.



The floor plan in this RoboCAD display has been marked off with grid points. Menus include line thickness and type, basic primitives, and file saves.

OTHER FEATURES On the other hand, RoboCAD includes some very useful features. A "magnetic snap" is supported, in which the user can determine how close to a snap point the cursor can be before it is trapped into position. Snap grids can be at an angle and can have different spacing between the rows and columns. Radial grids are also supported-a feature we found useful in drawing both the test's gear and the circular stairs in the house floor plan. The Erase function will erase up to the next handle point on the line, making for efficient partial deletes. Powerful tangent-finding functions are included, as are a host of curve-fitting algo-

rithms. The drawing area is divided into three "neges" that can be used to store and retrieve portions of drawings. Thus, you could keep a reference drawing on page 2 and pull portions onto page 1, while temporarily storing partial drawings on the scratch-pad page. RobocAD has flexible interchange of units—data that includes mixed metric and English units can be entered from the keyboard.

ROBOSOLID A \$1,500 add-on package from Robo Systems, RoboSOLID is a true 3-D modeling package that make a good partner to RoboCAD, which has a \$2,000 list price. RoboSOLID includes the same user interface design as RoboCAD,

although the icons are even more arcane. RoboSOLID has some serious limitations-for example, it will not draw circles. These limitations make it essential to use RoboCAD for the initial design of the two-dimensional components of the object. These components can then be sent to RoboSOLID to Extrude them into threedimensional space. RoboSOLID includes powerful Boolean operators, making it possible for two objects to be combined with Unite and Intersect. It is also possible for a piece of one object shaped like a second object to be removed with Subtract. To do the three-dimensional part, we first had to build several components in 2-D with RoboCAD and then extrude and unite them with RoboSOLID.

Other functions determine the density, weight, volume, surface area, center of gravity, and moments and products of inertia. Perhans because of the mathematical



Built to Last





Arche Rival 286" Pers The St. Louis Arch

Arche Rival 386" Pers The Arc de Triomphe de L'Étoile





Arche Station 88" Personal Computer The Arch of Titus



The Arch of Septimus Severus



Arche Pro-File 286" and 386" Servers

The Washington Arch

OUALITY ABOVE ALL"

While others in the computer industry seem preoccupied with offering cheap technology, Arche Technologies offers something different: Quality Technology. That's why every Arche product is designed by

some of the best engineers in the business, and why each unit is hand assembled in the United States, passing through a rigorous series of tests and inspections.



rest you please call: toll free 1-800-422-4674 or in MA

tion for these and other Arche quality products or for the quality dealer nearest you please call: toll fre (617) 461-1111. For Vertical Solution Reseller call: 1-800-272-8898 or in CA (415) 234-6313 Arche, Arche Logo, Rival 206, Rival 386, Pro-File 206 Server, Pro-File 306 Server, Station 80. Super Station 206, and Quality Above All are trademarks of Arche Technologies, Inc.

**Earthr Technologies Inc.

**Date: The Revision A.

**The Revision Arche Technologies Inc.

**Date: The Revision A.

**Date: The Revision A. intensity of these operations, a math coprocessor chip is needed to run RoboSO-LID.

FILE STORAGE Both Robe/CAD and Robos/DID Jone Books/DID Jone Books

 VersaCAD Design is an ambitious, full-featured, and powerful CADD system that incorporates both 2-D drafting and
 3-D modeling.

what name you saved it under.

The Robo Systems manuals contain spellings like "colour" and "centre," a dead giveaway that RoboCAD is of British origin. In fact, in the videotane that accompanies the software, a gentleman with a charming British accent welcomes you into the Robo fold. That aside, the manuals are better than average and reasonably well organized. In some cases the discussion of a command may leave you puzzled and wishing for a more thorough explanation, but a little experimentation usually clears up the mystery. We've seen better-known software with much poorer documentation. A useful tutorial is included with both packages.

RoboCAD and RoboSOLID are only moderately powerful packages. They can't claim to compete head-to-head with Auto-CAD—but many people purchase Auto-CAD thinking they need the power and ac-

tually never use a third of it. Robo Systems' delightful user interfaces make it easy to become a proficient and productive user in short order.—Donald C. Peckham and Martin L. Ramsay

VersaCAD Design

VersaCAD Design is an arbitious, fall featured CADD system that incorporates both 2-D drafting and 3-D modeling. The program instell is very powerful, but it suffers from a user interface that is cumberform. For more seemingly simple operasionse, For some seemingly simple operations, several menus have to be traversed, keys have to be pressed, and the mouse has to be moved before the function is completed. Once you understand all of the function key commands, however, you can access the full observed the report.

more readily. There are versions of the program that run on Unix-based machines as well as with the DOS operating system. The list of supported machines, graphics boards, digitizing tablets, mice, plotters, and printers is extensive. VersaCAD occupies about 6MB of space on a hard disk, without any drawing files, and it also makes use of a math coprocessor. Two serial ports are required unless plotting from a disk file is acceptable; the digitizing tablet requires one port and the plotter takes the other. A fully configured 386-based machine with lots of expanded memory, a very-high-resolution video board, and a large-screen monitor are needed to get the best from this pro-

EXPANDED MEMORY The minimum system configuration does not require expanded memory. However, if you are using an EGA card or other display adapter that does not have display memory that can be used to save views, expanded memory is essential. Without this memory it is not possible to pan or zoom the drawing the memory is made, these functions and if expanded memory is installed, these functions be engaged through the numeric keypad on the keyboard.

There are three main modules that make up the program: a 2-D environment that is used for drafting; a 3-D modeler that has some built-in primitives (others are created or alternately imported from the



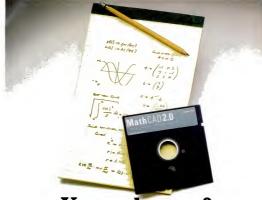
2-D environment); and a bill of materials program to generate parts lists that are based on the symbols used in a drawing created in the 2-D environment.

The installation is automated, and the various default subdirectories are established as the files are transferred from the floopy disks. Since the program comes on 88 disks, this type of installation is a necessity for most users. An option during the installation will remove unused device drivers at the end of the process, thereby savine disk space.

VersaCAD has an outer DOS-shell program that allows the various modules to be reached directly. It also includes external plot utilities, menu customization, and configuration changes that can, for example, alter the selected printer.

2-D PACKAGE The 2-D drafting package is suitable for an architectural or mehanical environment. There is a nuttline feature that allows two lines of a preselected width to be drawn. The Construct command offers typical mechanical features such as tangents and normal lines. You'll find that the number of options for each command is extensive and fills most needs.

The screen is divided into three main areas. The current menu is displayed vertically down the left side of the screen. The bottom four rows are used for status, cur-



Your pad or ours! What more could you ask for? How

If you perform calculations, the answer is obvious. MathCAD 2.0.

It's everything you appreciate about working on a scratchpad-simple, free-form math-and more. More speed. More accuracy. More flexibility. Just define your

variables and enter your formulas anywhere on the screen, MathCAD formats your equations as they're typed. Instantly calculates the results. And displays them exactly as you're used to seeing them in real math notation, as numbers, tables or graphs.

MathCAD is more than an equation solver. Like a scratchpad, it allows you to add text anywhere to support your work and see and record every step. You can try an unlimited number of what-ifs. And print your

entire calculation as an integrated document that anyone can understand.

is loaded with powerful built-in features. In addition to the usual trigonometric and exponential functions, it includes built-in statistical functions, cubic splines. Fourier transforms, and more, It also handles complex numbers and unit conversions in a completely transparent way.

Plus, MathCAD

Yet, MathCAD is so easy to learn, you'll be using its full power an hour after you begin.

equires IBM PC® or compatible, SI2KB RAM, graphics card.

about the exciting new features we've just added to MathCAD 2.0 ... · Built-in equation solver

- · Full matrix operations
- . Two to four times increase in calculating speed
- · Easier full-page text processing · Auto-scaled plots
- · Memory enhancements · Additional printer and plotter
- support · And more.
- If you're tired of doing calculations by hand or writing and debugging programs, come on over to our pad, MathCAD, The Electronic Scratchpad.

Call for a detailed spec sheet and the name of a MathCAD dealer near you. 1-800-MathCAD (In MA: 617-577-1017).

Silicon Specialties

LOGITECH MICE

LogiMouse	LogiMouse W/Logi Cadd Logi Buss Mouse W/Logi C
Logi Buss Mouse W/Paint Show \$ 87	LogiMouse W/Publisher
	LogiTook Hi-Doe Mouse

SOFTWARE

DATA BASE	UTIL	TIES	_	WORD PROCESSOR	s
MANAGEMENT	1 DIR Plus	Microsoft Windows 386	109	Easy Extra	
Clipper \$368	Brooklyn Bridge 69	Norton Commander	35	Grandview	
dBase III Plus	Carousel 2.0 43	Norton Utilities 4.0	46	Multimate Advantage II	2
dBase III LAN	Copy II PC 18	PC Tools Deluxe	36	PFS: Professional Write	1
DB-XI. Diamond 105	Copywrite 39	Printworks for Dot Matrix	39	Volkswriter 3	1
Fureka 88	Corefast	Printworks for Lasers	67	Volkswriter Deluxe Plus	
Genifer 188	Cruise Control	Referee	38	Webster	
Nutshell 72	Cubit Call		Call	New World Writer	
Nutshell Plus	Disk Optimizer 2.0 Call	Sideways	37	Prof. Soell Checker	
Paradox 2.0	Disk Technician 56	Smart Notes	43	New World Thesaurus	
PES: Professional File 119	Disk Technician Plus 69	SQ7 Plus			
Q&A 185	Double DOS 4.0 Call	Superkey	58	Word Perfect 4.2	C
Revelation Burno Disk 239	DS Back-Up Plus 46	Take Two MGR	66	Word Perfect 5.0	C
Revelation Run Time 109	Fastback 86	Turbo Editor Tool Box	58	Word Perfect Executive	C
R-Base For DOS 425	Fastback Plus 87	Unlock D Plus	49	Word Perfect Library	
Refex	Keyworks 53	XTree	35		
VP Expert Call	Mace Utilities 47	XTree Professional	61	Wordstar 2000 Plus 3.0	c
VP Info	Microsoft Windows 2.0 57			NING -	-
MONEY MANAGEMENT	ACCESSORIES		IKAI		
	Copy II	Chuck Yeager		MS Learning DOS	
Dollars & Sense w/Forcast . \$ 92 Toblas	Option Board Deluxe \$ 99	Adv. Flight Simulator	\$ 25	MS Flight Simulator	
Managing Your Money 4.0 . 114	MS Mach 20 Memory Plus 239	Lets C	38	PC Logo	



ell MD-2 City, 100 ...

MICROCOMPUTER MARKETING COUNCIL

MS Mach 20 Baseboard ... 299

Masterpiece

No Charge for VISA and Mestercard
We Do Net Charge Your Card Until Your Order is Shipped
You Pay the Ground Shipping \$6.00 jexcept Assists and Hawaii)
We Pay the Ar Difference
Free Air applies DRLY to orders up to 10 fb. A. Over \$50.

Teaches Typing

Typing Instructor II



telemant ORDER LINE

DOING BUSINESS SINCE 1980 A DIVISION OF CW MARKETING

FOX BASE PLUS SPECIALS MICROSO

MICROSOFT MACH 20 BASEBOARD

MICROSOFT WINDOWS 386

SOFTWARE

	3011	W		
COMMUNICATIONS	INTEGRATIVE SOFTWARE Ability Plus 3132 Enable 2.0 355 Framework II Call MS Works 105 PPS: 1st Choice 77 Smart Schware System 373 Symphony 455	DESKTOP PUBLISHING Newsmaster II \$ 39 Pagemaker 3.0 Call PPS: First Publisher 65 Ventura Publishing 475 PROJECT MANAGEMENT	Lotus Manuscript	79 89 295 309 67 285 599
79 Smartcom II 79 Smartcom II 136 MICE PC Mouse w paint (Buss or Serial) \$ 65 PC Mouse w Autotsketch (Buss or Serial) 99 Omni Mouse 49	MS Basic Compiler \$175 C Compiler (Microsoft) 259 Cobol Compiler (Microsoft) 415 MS Fortran Compiler 4.0 259 Lattice C Compiler .0 259 Macro Assembler (Microsoft) 86 Pascal Compiler Microsoft) 175	GRAPHICS	PFS Professional Plan Quattro Supercaic 4 Twm Classic	109 52 138 274 32 Call 82
Microsoft Buss Mouse 1.0 92	Quick Basic 4.0 57 Quick C 57 Ryan McFarlan Fortran 379 Ryan McFarlan Cobol 508 Turbo Basic 58 Turbo Pascal 4.0 58 Turbo Pascal 4.0 58 Turbo Pascal Dev Library 225	Microsoft Chart 3.0 229 News Room News Room 142 News Room 142 Printmaster Plus 29 PrintShop 32 Turbo Graphix Tool Box 58 VP Graphix 56 Windows Drawill 142 143 1	ACCPAC BPI DAC Easy Accounting DAC Easy Payroll In-House Accountant One Write Plus 2.0 One Write AR, AP, Payroll Time Slips	Call 52 38 105 117

To Place an Order 1-800-426-6659 To Follow Up on an Order (602) 944-2552 Order Line Hours Monday-Friday 7:00 a.m. 6:90 p.m.

Saturday 9:00 a.m.-1:00 p.m

Mailing Address: 8804 N. 23rd Avenue / Phoenix, Arizona 85021

 Order Processing (602) 944-1037 10:00 a.m-3:00 p.m. Mon.-Fn.

CIRCLE 206 ON READER SERVICE CARD

Telemant order line

telemart

Doing Business Since 1980 A Division of CW Marketing, Inc.

MIT SYSTEMS



Pictured Above PC XT Turbo -

PC/XT TURBO

10 MHz, 540K Memory, 150 Watt PWR Supply, AT Style Keyboard, 1-60K Drive, AT Style Case, Monographics Card w Parallel Printer Port, Clock Card w Senial Port, Mono Monitor with Swivel Till Base

P724 System w2 Drives

 System w/2 Drives
 \$ 797

 System w/1 Drives
 1-20 MG
 \$ 1007

 System w/1 Drives
 1-30 MG
 \$ 1034

777 il.

386 16 MHz, 1024K Memory, 200 Watt Power Supply, Enhanced Keyboard, 1.2 MEG Floppy Drives

\$2277

System W1.2 Floppy & 40 Meg Drive \$2710

Pictured Below PC/368 +





Pictured Above PC/286 Turbo +

PC/286 TURBO 12 MHz, 1024K Memory,

200 Watt PWR Supply, 1.2 MG Floppy Drive, Enhanced AT-Style Keyboard EGA Monitor, AT Multi I/O Card, EGA Card

\$1685 System W12 Floppy & 40 Meg Drive . \$2070

IIT MONITORS, CARDS, MODEMS & KEYBOARDS

MII MUNITURS, CARDS,	MUDEMS & RETBUARDS
Turbo w 640K 1 Drive	MIT Color Card
Turbo PC XT w 640K & 2 Drives	MIT UO Serial Clock
Turbo PC XT w 640K & 1 Drive & 20 MG	MIT I/O Serial-Parallel
Turbo PC XT w 640K & 1 Drive & 30 MG \$ 885	MIT Monographics Card
PC 286 12 MHz Zero Wart State w 1024K, 1.2 Floppy Drive \$ 975	MIT AT Multi IO
PC 286 12 MHz Zero Walt State w 1024K, 1.2 Floppy Drive 40 MG . \$1623	MIT XT Multi I/O
MIT Amber Monitor W.SW Till	MIT 1200B Modern (INT) with Software
MIT Color Monitor	MIT 1200B Modern (EXT) with Software
MIT EGA Monitor	MIT 2400B Modern (INT) with Software
MIT Mono Monitor with Swivel Tilt Base	MIT 24008 Modem (EXT) with Software
MIT Auto Switch EGA Card	MIT Enhanced Keyboard



HARDWARE

	TERS -	BOARDS	MONITORS
Alps All models Call	321 480	AST	Amdek Monitors Cell
Allegro 339	390	Hot Shot	
ALQ218 409	393 919	Six Pack Plus (256K) 195	NEC
ALQ224 479	Lazerine 6 1325	Xformer 560	Multisync II \$ 589
ALQ318 610	Panasonic	3G+ 219	Monographic System 1299
ALQ324 679	1080 I M2 165	Other Models Call	Other Models Call
2418 885	1091 1 M2 199		Princeton Ultrasync 485
2424 955	1092	ATI	Samsung Call
P2000 679	1524 560	EGA Wonder 175	Sony Multiscan (1303) 545
2100 1095	1592 409	VIP Plus 265	Mitsubishi
AST Turbo Lazer \$4310	1595 469	Hercules	Diamond Scan 499
CJTOH Call	3131 305	Color Card 145	Zenith
Citizen Printers	3151 475	Graphics Card Plus 175	1490
1200 139	Lazer 4450	Incolor 209	1490
180D 189	Star Micronics Call	11000 209	TERMINALS
MSP 40	Toshibs	Intel	
MSP 45 465	321 SL 489	Inboard 386 PC 719	Wyse 265
MSP 50	341 SL	Inboard 386 wicable 979	50
MSP 55	351 SX 945	4020 375	
Premier 35 509	Page Lazer	80287-6	85
Diconix 150 309			
	DISK DRIVES	Orchid	HARD CARDS
900		Designer EGA 299	Plus 20 MG \$ 525
Hewielt-Packard	Bernoulii Box	VGA 220	Plus 40 MG 659
	10 Meg \$ 889	Paradise	
Desk Jet	20 Meg 1015	Autoswitch 350 130	COMPUTERS
Lazer Jet Series II 1775	40 Meg 1559	VGA + 239	AST
	Beta Ext	VGA Professional 355	Model 80 \$1695
P2200 329	Beta Int 775	VGA FIDESSURE 330	Model 140X
850 Silent Winter 1539		Video-7	Model 140 2815
860 1950	Seagate	VGA 269	Model 340
890	20 MG w WD Controller 275	Vega Deluxe 180	Model 390
P2200 329	251-1 469	V-RAM 475	
P5200 520	AT 40 MEG Full Height 550		Other Models Celf
AP5300 685	Other Models Call	MODEMS	NEC
Other Models Call			Multispeed EL II 1495
Okidata Call	Teac	Hayes	Powermate Call
182+ 209	1.2 MEG AT 89	1200 \$ 280	
192+ 325	Floppy F55 BR 79		Toshiba
292 355	Toshiba	24008 385	T-1000 749
294 715	3.5 Dr 720K	Prometheus	T-1200F 1565
320	3.5 Dr 1.4MB	12006 w Sohware 75	T-1200FH
MENDALDO		2400B w Sohware 119	1200FB 2415
KEYBOARDS	DISKETTES	Other Models Call	T-3120 3058
Kaytronics	Maxell MD-2 Qty. 100 Call	US Robotics	T-3200
KR5151	Maxel MD-2HD Qty, 100 Call	Password 1200 175	T-5100 4899
KR5153 149	Sony 51/4 Qty 100 \$ 65	Couner 2400 289	Wyse
KB101 79	Sony 31/2 Qty. 100 159	Countr 2400E	386
13		Course 24/05	300 2/35

MMC MCACOMUTER MCACOMUTER ORDER LINE 1-800-426-6659

of the Description of CIRCLE 123 ON READER SERVICE CARD



DESK-LINK 2.0 Makes Disk and Printer Sharing a Snap.



Now there's one easy solution that lets your two desktop computers share files, a printer, even a single hard disk, all with just a snap. It works just like a mini-network. DESK-LINK* from Traveling Software, the makers of the award

winning LAP-LINK."

DESK-LINK allows you to connect two IBM or compatible computers, including the new PS/2 and laptops, with just phone wire and DESK-LINK software. Once connected, disk, printer, and file-sharing

DESK-LINK* ontware. Once connected, disk, printer, and file-daming works completely in the background. And with dual print sponding, you can use printers on either computer at the same time—without interrupting either machine. DESK-LINK* also comes with a pop-up "Talk Box" function for sending messages back and forth between computers, even while using your favorite applications. DESK-LINK* comes complete with everything you need. It includes both 5½ and 3% inch diskettes, universal connectors, and 25 feet of RIII standard telephone cabling (which can be extended to 100 feet.) The documenta-

connectors, and 25 feet of RJ11 standard telephone cabling (which can be extended to 100 feet). The document tion is straightforward and easy to understand.

Best of all, DESK-LINK* installs painlessly in minutes using your computer's serial port. No add-in board is required. It has incredible communication seeds of 115.000 band and supports EMS memory. Plus.

required. It has incredible communication speeds of 115,000 band and supports EMS memory. Plus, DESK-LINK* is compatible with Novell, 3Com, and Token Ring networks. So if wait's looking for a fast, increasive way for war two computers to share files, printers, or hard disks

So if you're looking for a fast, inexpensive way far your two computers to share files, printers, or hard disks—all completely in the background—snap up DESKLINK*
today. You'll find it at your local computer store for \$169.95—that less than 885.00 per computer.

Traveling Software

\$169.95 — that's less than \$85.00 per computer For more information call: 1-800-343-8080, or 1-206-483-8088. Traveling

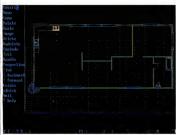
CIRCLE 223 ON READER SERVICE CARD

Traveling Software, Inc. • 18702 North Creek Parkway • Bothell, WA 98011

Token Ring and IBM are trademarks of International Business Machines Corp., 3Com is a trademark of 3Com Corp., Novell is a trademark of Novell. Inc., Traveling Software, LAP LINK and DESK LINK 20 are registered trademarks of Traveling Software, inc.



VerstCAD Design's 2-D module is capable of both mechanical and architectural drafting. Its dimensioning capabilities are easy to use, but there are limitations to the dimensioning of circles or radii



With VersuCAD Design, you use the Modify menu to change entities individually. When the mouse is on the drawing area, the selected entity blinks. To change several entities at once, you would use the Group men instead of the Modify commands.

sor coordinate positions, and system messages. The remaining portion of the screen is devoted to the drawing area. The mouse will not reach the status area, but it does access the menu on the left.

It is easy to lose the mouse cursor on the screen when using an EGA as the display device. During testing, not only could the cursor be moved to an area of the mean that was blank, where it disappeared, but it could also be moved off the top and ridges of the drawing area. The mouse cursor also disappeared when a selection from a long list of commands in the men yield-

■ VersaCAD's 3-D modeler module is flexible, easy to use, and makes the program, as a whole, worthwhile.

ed a short submenu. It didn't move onto an active command in the new menu as you would expect.

A mouse or a digitizing tablet can be used with the program for entering coordinates in a typical CADD fashion. For placement where the relative or absolute coordinate is known, the keyboard can be used instead. The selection of the input mode is performed via a function key, and this will allow one end of a line to be marked from the keyboard and the other by moving the mouse.

There are a large number of commands available through the menus, but the hierarchy does not correspond with the menu structure in many cases. Extensive use of the function keys helps to give the menu structure some logic.

All the important central features are in the Add and Modify menus. The Add menu is used to enter lines, ares, curves, and so on, and the Modify menu is used to move, cupy, rotate, and edit them. The Modify menu operates on one item at a time—a circle or an are, for example. Entering of basic shapes like lines.

Enson* 1.0-2500 Tushika P3718V ACCEL 500 INT Work500°

And we'll ship it to you FREE for 30 days.

The bad news is, this is a quiz. The good news is, we're going to make it easy.

All three of these 24-pin dot matrix printers are versatile, rugged office-quality printers. They ail provide a variety of type styles and compatibility with most popular software. But there's only one Top Dot. And all the clues you need to find it are right here in this ad.

to find it are right here in this ad. Top Dot's high performance features include combined letterquality text and graphics, color printing, and a sizzling 480 cps draft speed.



SelectDial puts total printer control at your fingertips.

A unique Select-Dial™ feature gives Top Dot effortiess, fingertip control. And piug-in Intelli-Cards™ provide instant software upgrades.

Top Dots \$985 price is a remarkable \$500 below comparable printers. Even more remarkably, it includes toll-free hotline support, a 2-year warranty, an unheard-of full year of on-site service, and a Oulek-Start kit packed with \$150 worth of supplies, software, documentation and more.

■ HIGH-END CADD

arcs, and circles is done through the Add menu. Apart from the line function, these commands must be selected each time for use. Text is entered using the Text command on this menu. The characteristics of the entity that is selected can be changed midstream using another function key to access the Properties menu.

access or roboruses interna.
When in the Modify menu, the item to be edited blinks on the screen. To select a different element, the Forward (or Backward) command is used. Each object in the current display window is highlighted in turn until the desired item is reached. In a complex area this selection process may prove to be slow. If more than one entity is to be modified at once, the required may not be modified at once, the required may and then modified as a whole.

3-D MODELER The 3-D modeler module is easy to use and makes the program, as a whole, worthwhile. It suffers from the same poor mouse interface as the 2-D module when used with an EGA, but otherwise it is very flexible. There are two

main areas within the 3-D module—the Modeling and Create environments.

The Create area is used to generate new primitives, import 2-0 drawings, and perform modifications. When an entity—a box, for example—is placed in the Create environment, it is shown in exploded view. Each side of the box is moved away view. Each side of the box is moved away from its adjacent sides, and the comers of each side are shown as other, called points. In this mode, new planes can be generated and sides and roughs bidden or exposed.

Two-dimensional objects that were generated in the 2-D module and had been assigned a dimension in the z-axis can be imported for use in the 3-D environment. There are limitations on the complexity of the model that can be held in the Create area, but since most objects can be manipulated in sections, this isn't really a problem. The Modeling area will hold all of these sections at once, and the Create area can be used on parts of the whole drawing.

The model is then transferred to the modeling environment for viewing and manipulating in a more realistic form. The module will display and save hidden-line views and shaded views. Isometric and perspective projections are easily created.

BILL OF MATERIALS. The third modlein VersacDD retign is the Bill of Materials. This module is used to generate parts lists for drawings created in the 2-D module. It makes a count of the number of occurrences of a particular symbol in a drawing. It is workman-like, and though it's not as sophisticated as some other programs' modules, it does get the job done.

VersaCAD Design, which has a \$2,995 price tag, is not for the casual user. The sheer size and complexity of the program is frustrating for quick productivity, but once you become more proficient, this feeling diminishes. As is the case with many high-end CADD packages, the company-offered training courses would probably prove useful. A well-equipped, fast machine is essential to the successful use of VersaCAD Design as well, but with adequate hardware and training, this is an excellent product. Such smooth interaction between the 2-D and 3-D modules is available from few manufacturers, and the 3-D modeler is easier to use than most others.—Caroline Halliday

COMPARISON CHART AMT Enson Toshiba Accel-500 LQ-2500 P351SX Print speed (12cpi) Draft Mode Memo Mo 200 ms NA 100 cms LQ Mode 80 cos Plug-in fonts card cont cartridge standan Color printing Warranty 24 mo 15 mg 18 mo On-site service 1 vr \$1499* Price \$965 Starter Kit NA

And only Top Dot is available in your choice of finish: Executive Black or traditional lyory. You have to visit a dealer to buy two of the printers on this page.

But you can get Top Dot delivered to your door by UPS.* Just call 1-800-637-7878, correctly identify the Top Dot, and

**manufourn's sugarated bits price + 1528
we'll ship it to you. FREE.* If after
30 days, the Top Dot hasn't become
indispensable to your office, just
send it back. Otherwise, do nothing.
We'll charge \$985 to your credit.
card or bill you against your purchase order. That's all there is to it.

chase order. That's all there is to it.

And if you're still not sure of the
answer, don't worry. Our operators
will give you three chances to get
it right.



Quick-Start Kit contains supplies, cable, software, documentation—even transparency materials. A \$150 value FREE with Top Dot.

ACCEL-500 1-800-637-7878 **■**

Ventura Peripherals, 100 Rancho Road, Suite 27 Thousand Oaks, California 91362

*Offer subject to availability and credit approval.
CIRCLE 317 ON READER SERVICE CARD



AutoCAD Cadkey

AutoCAD is the industry standard with good reason: its documentation is superb and its 2-D drafting features remain unparalleled, even in the face of increasingly strong competition. Cadkey, on the other hand, offers an unbeatable user interface, good 2-D drafting capabilities, and strong support for 3-D modeling. Both programs benefit from strong

third-party support.
These days, speed is more of a
hardwar issue than a software issue in the CADD arena. Rather
than agonize over whether the
CADD software you select is the
fastest or slowest, try to maximize
the power of your PC first. Then any
CADD package you use will seem
more responsive, and redraw times
will shrink.



Servicing our PC buvers with low pricing and technical experience since 1979.

-HARDWARE-



er \$100 and receive one of these disks absolutely FREE! Purci er \$250 get two free diske, over \$400 get three, or get all four disks when your tribase is over \$5001 1) MIXED BAG, 2) PC-WRITE, FONT-SET, 4) ABC-LIST.

Accessories	
Brooklyn Bridge Universal \$71	į
Copy II PC Deluse	۱
Curtis Ruby	
Mach III Jovetick	
Masterpiece	
Masterpiece Plus	
Sted-Watt 4	
150 Watt Power Supply th	
Logical Connection	

Boards

tage Premium 179 764

COMPUTERS AZ 366 Wyse 386

AZ Turbo 8088-2 IRM Corpostible Computer 125 640K Ram & expansion slots 088-2 processo

AZ Turbo 286-10 512K, 8 & 10 MHZ, keyboard, 200 wr wer supply, one 1.2 Tales drive genix Bios

> Shipping on most software is \$5.00.
> AZ orders add 6.7% sales tax. Personal/company check allow 14 days to clear
> We accept Purchase Orders from authorized institutions for 3.5% more than cash price. (Please call in first.)

Floppy Drives Hard Cards

Hard Drives

Keyboards

Incredible Values

Mice

Modems

cs KB101-1

Plus Hardcard 40 MB

be 20 MB ste 20 MB w/Cont ste 30 MB w/Cont ate ST 125 w/C ata ST 251-0

Laptop Portable Computers EC Multispeed EL-2 NO Z163 20 MB

AST 286 Premium or 386 Premium Computers 512K, RAM RT anhanced style keyboard, parallal, seniel and clos 1 2 MR finney delix drive. Texnener Seat Prince

AZ 10

EGA Boards AST VGA ATI VIP NEC 1024 Orchid Designe Paradise Auto 480 Paradise VGA Plus Paradise VGA Prof

EGA Monitors 40EK 722

Everex 300/1200 Everex 2400 int. Eversit 2400 Ext. Haves 1200 Heyes 2400 III S Bobotics 2400 U.S. Robotics 1200 Pt

AZ 300/1200

Monitors seton Max 12 sung TTL Ami

Printers 288 P5XLP P52005 P2200 P6-P7 C

Laser Printers Toohibe Page Lase

Co-Processor 0287 (Intell) 287-8 Or

a All returns are sub-There will be a 20% restock fee on all returns.

92 98 155

196

Sorry, no refunds on open software, due to copyright laws.

1-800-421-3135(Ext. 100)

We Stock Products

SAVE 60% All Available On Our Everyday Prices

We Cater to the First Time Buver Call our friendly technical service

(602) 246-2222

THIS MONTH'S SPECIAL MICROSOFT PC Excel SPECIAL \$275

-SOFTWAREnos Accounting Languages Litilities \$54 36 39 Dac Easy Acet DOS Dac Easy Light . Dac Easy Payrol 31 Dollers & Sense Prokey 4.0 Q DOS II Rightwriter 117 75 Educational of Learning DOS Turbo Tutor II Sidew S.O.S. Typing Tutor IV 802 Communication Programs Multi-User Softw Entertainment oldyn Bridge U rbon Copy Plus ossterk XVI osstalk MK4 110 Word Processing Easy Extra 140 Choice Word senery Disk 1-7 **Project Manager** Ster Flight Data Base neline 2.0 Managers Graphics and Perfect Exec Word Perfect Library 2.0 O Base III Plus Spreadsheets ter 2000. DB-XI, Diemond tar 2000 + Lega Diagram Maste Easy Cad . . . 189 285 435 139 186 329 Microsoft PC Excel 168 We Feature nChar130 Microsoft Software for the R Base For DOS MacIntosh 112 Nate & Report Utilities Call For Copy II PC Copyer Cubit ... D.A VE 39 39 55 72 Desktop Publishing Integrated Items Not

Diskettes discart 10 MB 79 24 nouticart 20 MB Maxet 51/ DS 20

> · All Prices are subject to cha · Sorry, no COD ordera

We do not guarantee cor

nimum phone order \$50 or

Languages

Phone Hours: Monday thru Friday 7 am-9 pm. Saturday 9 am-5 pm MST.

HTEST

Listed.



33 55

> Phoenix, AZ 85051 1-800-421-3135





Why build a printhead that can punch through aluminum, when all you need is a clear impression on a 5-part form?

The answer is uncompromising quality.

We built our new 300 Series 9-pin and 24-pin printers tougher and more reliable than they have to be. With printhead pins of carbaloy/tungsten, one of the hardest metals known, they're tough enough to make a crisp impression on a sheet of aluminum. So you can imagine how sharp they'll look driving clear to the bottom of a 5-part form.

Even after printing on aluminum, we look this good on paper.

Our engineers call this "championship specs." More than 3 million loyal users call it rugged reliability. And it shows in the quality and performance of every printer and modem we make.

Call 1-800-OKIDATA for the dealer nearest you.



NO-WAIT LASERWRITERS

APPLE Adds SPEED to the POWER of POSTSCRIPT

t's been 2 years since Apple introduced its LaserWriter Plus—sigger, better model of the Laserwriter, a printer that hed already senew standards in decktop publishing. The versatile. With its use of PostScript, Aduibe Systems' powerful page decktoplanguage, the printer had brought deskupe publishing from siscous and glue to pixels and bytes, giving users the closest thing to Event though it was limited to do not roobe the standard of the size of the size of the size Event though it was limited to do not roo-

Even though it was limited to four typefaces—Courier, Helvetica, Times Roman, and Symbol (the last being no more than just a collection of the Greek alphabet and mathematical symbols)—the original LaserWriter was in and of itself a fullfledged computer capable of 300 dot-perinch near-typeset-quality output.

With the LaserWriter Plus came a 12-MHz Motorola 68000 processor that produced copies in record time, a generous 1.5MB RAM that buffered lots of pages, and 512K ROM that played host to a Post-Script interpreter and plenty of fonts.

Apple's recognition of the DOS environment and the growing

number of applications that support PostScript are redefining

what we consider top-notch output in desktop publishine.



But sadly, the LaserWriter and the LaserWriter Plus made few of these gifts available to the IBM hemisphere of the PC

available to the IBM hemisphere of the PC world.

NOT READY FOR PC PRIME TIME By the most stringent definition of compatibility, Apple's original LaserWriter and LaserWriter Plus were IBM PC compatible—but just barely. They were not

patible—but just barely. They were not compatible by any average user's definition, and they certainly were not as compatible with the PC as they were with Apple's own Macintosh. Their abundant offerings were difficult to reach from the world of MS-DOS. And PC users, when they could get to them at all, often found that few of the benefits of PostScript were at their disposal.

The original LaserWriter was PC compatible only if your software supported PostScript (hough it did offer a Diablo 630 emulation) and used the XON/XOFF handshaking protocol. The LaserWriter Plus could be made to be PC compatible, but the job was difficult. The PostScript

week These O'Course

■ LASERWRITER HINT AND HINTX

code that was needed to adjust the printer wasn't available from Apple or from Adobe Systems when the LaserWriter Plus first shipped. The LaserWriter was, after all, a Macintosh enhancement. Later, a code was developed and published in Apple's Inside LaserWriter, a manual for programmers and developers.

Even then, the task was daunting to all but the most enterprising programmers. When they did assemble all the elements to make the Laser-Writer and the PC cooperate, they d'of often find a dearth of software that supported PostScript and disappoint in greatls from the few programs that did. PostScript support in PC software frequently means getting text on the page, and little else. In short, the Laser-Writers were not ready for PC prime time.

PC Magazine's contributing editor Charles Petzold reviewed the LaserWriter Plus with qualified wonder in our third annual printer issue (PC Magazine, November II, 1986, page 298), "PosScriptis on the way to becoming a standard for page description languages," he wrote, "but the LaserWriter Plus needs much more software support before it can serve as a general-purpose PC printer,"

GOOD NEWS That was more than a year and a half ago. Since then, everything has changed with the birth, in 1988, of Apple's second generation of LaserWriters—the \$4,599 LaserWriter IINT and the

56,999 LaserWriter IINTX.
No longer is Microsoft Word the only major PC word processing program that supports PostScrip formats. More than 20 word processing programs, including such heavyweights in the copporate market as WordPerfox, Mans-11, WordSar 2000, and Samuna, now support PostScript. The dealtop publishing programs that support words that the programs that support words of the programs that take advantage of the language as well.

Moreover, if you expect to find support for PostScript only in word processing, graphics, and desktop publishing, think again. PostScript drivers are showing up in more and more databases, spreadsheets, and integrated programs, including Javelin, Symantec's Q&A, Omnis Quartz from Blyth Software, Borland's Quattro, Mis-

Apple LaserW Summary of F	riter IINT and III eatures	
	INT Sec.	IINTX
List price	\$4,599	\$6,599
Type	Laser	Laser
Engine	Canon LBP-SX	Canon LBP-SX
Max. paper width (inches)	8.5	8.5
Claimed speed (ppm)	8	8
Tested speed (ppm)	6.8	7.0
Controller	11.5-MHz 68000	16.7-MHz 68020
ROM	1MB	1MB
RAM	2MB	2MB (expandable to 12MB)
COMPATIBILITY		3 8 8 8 8 8
IBM character set	Low	Low
Graphics	- PostScript	PostScript
Text y	PostScript,	PostScript,
	Diablo630	Diablo630

crosoft Excel and Microsoft Works, and Lifetree Software's Words and Figures.

In the new LaserWriter IINT and IINTX, all you do to put the power of Post-Script at the disposal of these programs is install the driver and print directly through a serial port connection.

What's more, the Apple has added a Hewlett-Packard LaserJet Plus emulation to the Diablo 630 emulation of the earlier generation and has appended the manual with 15 pages of instructions for those of us who come to the LaserWriter IIs from the MS-DOS world. The appendix gives step-by-step instructions on such procedures as how to use DOS's MODE command to facilitate the serial port connection; adjust handshake settings so that the computer knows when (and when not) to send information to the printer (Laser-Writers are preset with the XON/XOFF handshake); set the Laserlet and Diablo 630 emulations; change parameters; connect both the NTX and your PC to a Local-Talk (formerly called AppleTalk) network; and troubleshoot the devices.

SAME DIFFERENCE Better access from a PC isn't all that's new in the new generation, although the printers' various

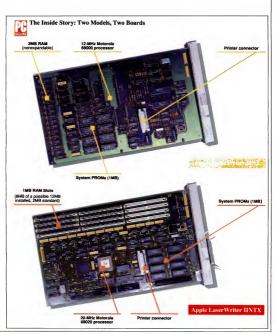
arrays of features are shrouded under a casing as plain as the proverbial brown wrapper. Cover the labels with adhesive tape,

and you can't tell them apart.

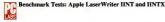
The LaserWhier III sare built on a modular design and have interchangeable parts that allow for easy upgrades. The NTX (the acronym refers to networking and expansion) is built around Motorola's 16.7-MHz 68020 microprocessor and claims a Writer Plus. The PostScript interpreter to generate sophisticated text and graphics is included.

The LaserWriter IINT and IINTX will completely replace the LaserWriter Plus in Apple's line. Another newcomer from Apple, the \$2,799 LaserWriter IISC, designed for single users and for use on Apple equipment only, supplants the original LaserWriter.

This trio is speedier. Apple claims that this trio is speedier. Apple claims that printers produce about 8 pages per minute, and they come with more RAM for even more fonts. Eleven foot families with 35 typefaces come with the NT and the NTX. The NTX is designed for use on LocaTalk networks, and you can expand its active memory to 12MB and



■ LASERWRITER HINT AND HINTX



apparent superiority of a plain-vanilla text-based laser printer like the Hew rd LaserJet Plus for text printing is ing. Without having to do font compo nent, it blazed away at the Text Pag d test, averaging 7.5 pages per minut add graphics to the equa see an entirely different result. PostScript s clearly came out on top in ou nics Page speed tests, with the sk nter taking less than half the time of the HP rJet Pius. If you consider the results of the Apple LaserWriter iiNTX after it has goed the fonts once and stored them in ory (second Graphics Page), you will understand the advantage of having a nt description language like Por

The Text Page benchmark lest results were obtained by timing the printing of ten copies of a two-page business left The two single-spaced pages contained a total of 2,898 characters and called for one PostScript font. The times

The Graphica Page binchment test consisted of printing free detection gapes or mixed graphics and feet. Beliefle carrying out several PostSoript graphics requires, each printing premated the same six Predicting forces in the sam mixture of type styles and sizes. The increase in speed between the first and second pages reveals the first cache. These are given in seconds per gape; results for the second Times are given in seconds per gape; results for the second Parlamenta Times
primarie Times
primarie
primarie Times
primarie
p

Text Page	First	Secon
8.0	208.7	191.1
9.2	98.3	41.8
9.8	76.3	36.8
8.8	74.0	35.3
8.6	47.6	33.1
	Page 8.0 9.2 9.8 8.8	Page page 8.0 208.7 9.2 98.3 9.8 76.3 8.8 74.0

even add a hard disk to store fonts.

In the NT and NTX, Apple has refined the concept of the universal engine. Using a 300-dpi Canon LPB-SX xerographic machine with a delivery speed of 8 ppm as imule, the NT model is simply a specific controller board with output ports plugged into the engine. Likewise, the NTX is nothing more than that same type of controller board with more features.

Both models of the printer are equipped with the standard Apple typeface family introduced on the LaserWriter Plus. Courter, Helvetica, Times Roman, Palatino, Bookman, Avant Garde, New Century, Schoolbook, Symbol, ITC Zapf Chancery, and ITC Zapf Dingbats (a collection of art symbols). Pet users may be disappointed to discover that there is no support for the high-perior IBM character.

CERTAIN DISTINCTIONS The NT is the low-end model, powered by an 11.5-MHz Motorola 68000 processor. Its standard features include 1MB ROM for the PostScript code, 2MB RAM (nonexpandable), and an RS-232 port, as well as Lo-

calTalk and Apple Desktop Das interfaces. The NTY is the printer you should buy for your production department. Its processing power comes from a Motorola costing power comes from a Motorola everyday grise it's packed with the same thalk ROM for its Fouckery code, but that's where the similarities end. The base configuration includes 2MB RAM in two 1MB SIP packages. The controller board contains sixts for it 23Ph in all, giving you a maximum of 12MB. Along with the MOTOR CONTROLLER CONTROL rently intended as a connection point for a hard disk for additional typefaces (much as Varityper has done with its VT-600 laser printer; see *PC Magazine*, November 10, 1987, page 237).

The bad news is that at present, the hard disk configuration is valid only when you are running the printer in an Apple network. The expansion socket on the NTX controller board is meant for ROM expansion, and one hopes that in the future, that socket can be adapted to IBM-compatible networks.

Translating all these new technical features into terms of office productivity is simple. On the PC Labs printer speed test, the NT clocked 6.8 ppm over a 20-page sample oulpul while the NTX sprinted through the test at 7.0 ppm. Because there is no such thing as a "resident fort" in a

How to look good from start...



to finish.

The HP LaserJet Series II Printer.

Nothing brings your ideas to life like the HP LaserJet Series II Printer from office memos to forms

to newsletters. As the leading laser printer, it works with all popular PCs and PC software packages. And, with a wide range of fonts, you get more options to create superior looking documents.

aserdet William Willia

With additional memory you can even print sophisticated 300 DPI full-page graphics. And with HP's ScanJet scanner, you can also easily add photographs,

No wonder more people choose the original over all other laser printers

combined.

So call 1800 752-0900, Ext. 900D for your nearest HP dealer.



PostScript engine, these times include the delay needed to image the selected font (we used Courier, the default) before the first page was printed.

WHY BUY WHAT'S NEW? You may be perplexed at the apparent similarity in paper delivery speed. The older Laser-Writers, as well as the NT and NTX models, are all rated at 8 ppm. They will never run any faster than that, and, since both old and new models are rated the same, why bother with the new machines at all? The answer to that question lies in the difference between paper delivery speed and throughout speed.

Everything you do with a PostScript printer is done via graphics. The typefaces it contains are not the actual fonts, which aren't imaged into memory until you use them, but merely descriptions of how to create them. Creating a font is relatively simple. Real speed degradation takes place when you use a more complex graphic, like a picture from Windows Paint. In order to combat this speed degradation, Apple has boosted the internal processing speed of the NTX. To test how rapidly a printer can handle imaged fonts and text combined with graphics, PC Labs has devised a new benchmark test called the Graphics Page test.

Three pages were printed for this test. Ideally, all three of them should have printed at the same speed, but because of the overhead involved with imaging fonts, the first page took longer. For the NT, the first page took 74 seconds, while the second and third pages each took 35.3 seconds. The 38.7-second gap between the two times represents the time it took the NT to image the requested fonts. The NTX displayed its speed advantage by taking 47.6 seconds to pump out the first page, with the second and third each arriving after 33.1 seconds.

While there was only a 2.2-second difference in printing the last two pages between the NT and NTX, there was a 26.4second difference in the time it took for the first page to appear. Imaging time for the NTX was only 14.5 seconds, nearly half of what the NT required. It's this operational speed that you pay for in the NTX and are paid back for during your production runs. If it all sounds a bit incidental here, consid-

FONT POWER

The new LaserWriter IIs continue Apple's tradition of offering many standard typefaces.

LaserWriter IIs in particular, is the num-

ane of the advantages of a PostScript ics-oriented language can handle with One of the advantages or a rostoctupe laser printer, and of the Apple ease. All of the following typefaces are stored in the ROM of both the Laserber of fonts and typefaces that the graph-Writer IINT and the LaserWriter IINTX.

Times Roman Bold Italic

Courier Courier Bold Times Roman Bold Courier Italic Times Roman Italic

Courier Bold Italic

Helvetica Σψμβολ Helvetica Bold αβγδεφητισκλιινοπθοστυσωέψζ Helyetica Italic ΑΒΧΔΕΦΓΗΙΘΚΛΜΝΟΠΘΡΣΤΥΟΩΞΨΖ

Helyetica Bold Italic 1234567890!::#3%L&*()-=_+[]{}::|~,<.??;;

Palatino New Century SchoolBook Palatino Bold New Century SchoolBook Bold Palatino Italic New Century SchoolBook Italic Palatino Bold Italic New Century SchoolBook Bold Italic

Helvetica Narrow ITC AvantGarde ITC AvantGarde Bold Helvetica Narrow Bold

ITC AvantGarde Italic Helvetica Narrow Italic Helvetica Narrow Bold Italic ITC AvantGarde Bold Italic

ITC Bookman PTC Zapf Chancery ITC Bookman Bold PTC Zapf Chancery Bold ITC Bookman Itakic ITC Zapf Chancery Italia

ITC Bookman Bold Italic PIC Zapf Chancery Bold Italic

☆*+********* ♥♥♥♥♥♥♥♥♥♥♥♥♥♥

er the time savings that would accrue in an office where many users, each with their own documents containing different sets of fonts, are continuously making demands on the printer.

ADDED BONUSES Another bonus with the NTX is that, while both printers contain the standard PostScript batch and interactive modes as well as Diablo 630 emulation, the NTX's included HP Laser-

Jet Plus emulation is so exact that it replicates the LaserJet's penchant for holding onto the last page until it gets a form feed. (Remember, all emulations are written in PostScript, so the performance of a printer running under an emulation will usually be slower than that of the same printer, or of the printer it's emulating, running in its native mode, i

As an added bonus to PC users, the communications handshaking protocol

Small cash input for laser-quality output.





it's also easy to use. It does your important office tanks, but it's small scough to fit or your desk. Posrything considered, it's the perfect personal printer.

And one of the most smasing features of all is its price. It's under \$1,000.



The HP DeskJet Printer. Laser-Quality Output for Under \$1000.





we never stop



THIS IS WHAT HAP LET OUR CUSTOMERS

This is not exactly your typical dot matrix printer. But then, the new ALPS Allegro 24 wasn't built in typical dot matrix printer fashion.

It's the result of a highly sophisticated new design process, never before attempted by any other printer company. We call it "Giving the Customers What They Want."

You told us you wanted a

rugged 24-pin printer for under \$500. Which the Allegro 24 is. You wanted it to churn out page after page of crisp, letter-quality output. Which it does. And you wanted it with easyto-use front panel controls. Which, of

to-use front panel contro course, it has,

Then you insisted that it be jam-proof. Which explains this printer's uncharacteristic profile. You see, it has no platen. Just a unique flatbed design for a



PENED WHEN WE DESIGN A PRINTER.

paper path that's straight, direct and virtually uniammable.

As if that weren't enough, you asked for and got—features like "paper parking," for automatic switching from fan-fold to single sheet feed. Four resident type fonts. And full compatibility with most all the PCs and software you already have.

For a free demonstration of the printer you've always wanted, see your local ALPS dealer. Or direct your questions, comments

and brilliant ideas to us at 800-828-ALPS. In California, 800-257-7872.

And help us design our next printer.

ALI

AMERICA Built by popular demand.

Allegro 24 is a trademark of ALPS Electric Co., Ltd. © 1988, ALPS America

CIRCLE 242 ON READER SERVICE CARD

Presenting the Ricoh PC LASER 6000 personal printer.

At six pages per minute, it's the perfect tool for people who like to work, not to wait. A printer that'll give your input the kind of output you'd expect from a machine four times its size.

Its sleek, compact body measures in at a mere 16 inches wide and 16.5 inches deep. Which practically gives you the freedom to place it just about anywhere in your office. (However, we simply suggest you put it next to your PC.)

It also comes with its own printer control language that's supported by a variety of popular software programs. Add one of our optional emulation cards, and your choice of compatible software is virtually unlimited.

The Ricoh PC LASER 6000 also has one megabyte of memory (expandable to two) so you can print the most sophisticated desktop publishing graphics.

And best of all, it's very affordable.

And best of all, it's very affordable. So, the next time you're waiting around for your current office printer to print, look into buying a Ricoh PC LASER 6000 for yourself.

It's a great way to get out on your own.
For more information on the Ricoh PC
LASER 6000, call

1-800-HI-RICOH. To each, his own.

■ LASERWRITERS



Apple LaserWriter HNT Apple LaserWriter HNTX Apple Computer Inc. 20525 Martant Ave.

20525 Martani Ave. Cupertino, CA 95014 (408) 996-1010 List Price: IINT with IMB ROM, 2MB

RAM (nonexpandable), RS-232 port, Local-Talk and Apple Desktop Bus interfaces, \$4,599; IINTX with 1MB ROM, 2MB RAM (expandable to 12MB), RS-232 port, Local-Talk and Apple Desktop Bus interfaces, SCSI interface, \$6,599; upgrade from IINT to IINTX, \$2,499.

Dimensions (HWD): 8.6 by 20 by 18.5

Weight: 45 pounds
In Short: Apple's two new PostScript-based
praters, both of which are built around the
same Canon engine, offer speedier printing

times, plenty of resident fonts, and ample memory.

(XON/XOFF, ETX/ACK, or DTR have handshaking) is which selectable from an eight-swisch DIP at the NTX contuler's mounting panel. The four-swisch arrangement on the NT board is used soler by to select among batch, interactive, Lo-calTalk, or Diablo emulation. Handshaking changes (needed for some software, especially if you're using Diablo emulation) must be programmed in PostScript on the NT. Thankfully, Appendix C of the munual details how to do it correctly.

LONG-AWAITED DELIVERY We've long been sold on PostScript's potential. The LaserWriter IINT and IINTX seem like just what we've been waiting for, albeit for too long.

In today's market you can find Postscript printers that have more fonts and more power, but, for their price points, the NT and the NTX offer much that we find attractive (the typefaces are potentially worth thousands of dollars by themselves). Perhaps best of all, they begin to bring together the separate and not-always-equal worlds of the PC universe.

Carol Ellison is an associate editor at PC Magazine. Bill O'Brien is a project leader in PC Labs.

Nobody ever thinks of PC AT batteries until it's too late.



Without a functioning battery, your computer is as good as dead. The battery in your PC AT or compatible controls your computer's configuration files, real time clock and calendar. When the clock and calendar begin to fail, your battery's hours are numbered.

No be prepared. Get the best replacement battery you can buy. Get a TADIRAN battery from IBC—the high quality, high energy lithium battery that is already found in 80% of all PC AT's and compatibles as original equipment.

A unique 3 year warranty, 10 year shelf life, and UL approvad make a TADIRAN replacement battery the best insurance there is. So don't wait until your computer battery dies. Get a TADIRAN replacement battery from BEC today.

ORDER NOW! 800/654-3790 (US) 800/225-9359 (CA) Price only \$27.50

Dealer inquiries welcome.
 Corporate discounts
 available

available.
For IBM PC AT, Compaq
286, and all other AT

compatibles and clones.
Checks, money orders,
and credit cards welcome.
Add \$3.00 for shipping and

handling.

International Battery Corporation 16735 Saticoy Street, #111 Van Nins, CA 91406

(818) 781-7515, FAX (818) 781-7804 IBM AT, and Compaq 236 are respective tesdemarks of IBM Corp. and Compaq Corp.

Call for all Six-Pack replacement batteries.

USER-FRIENDLY

CompuAdd Computers for Compatibility, Reliability, and Easy Setup!

Switch Selectable

80286 Processor

. Ratas 9.4 on Norton's Si

Renchmerk Tast 40

5060, 5151, or 101-Key

Enhanced Keyboard (Your Choice)

Speed

512KB BAM

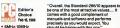
Clock/Calandar

Standard-386/16



- · 4.77, 6, 8, 16MHz Software Salectable Spead R0386 Processor Landmark Speed Rating
- of 20MHz . Rates 178 on Norton's SI
- Benchmerk Test 4.0 . 1MB RAM (expandable to 4MR)
- 5060, 5151, or 101-Key Enhanced Keyboard
 - (Your Choice) 1.2MB Floopy Drive · Real-Time
 - Clock/Calandar · One-Yeer Limitad
 - Warranty Seven Expansion Two 8-Bit
- w/Battery Beckup . One-Year Limited Warranty 200-Watt Power Supply Stots: Five 16-Bit & 1.2MB Floppy Drive

Standard-286/10



precisely as you would expect. You should be happy with this one - Attred Pos

PC Magazine, Feb. 16, 1986



2/11/11/19

\$1995 \$995

- 80286 Processor + 5060, 5151, or 101-Key
- 1.2MR Floory Drive
- Enhanced Keyboard

Both Systems Include...

- w/Rattary Backup One-Yeer Limited
- Warranty . 200-Watt Power Supply

Standard-286/8 8MHz-8MHz Switch-Selectable Speed

512KB RAM



Keyboards



Standard-286/12

8MHz-12MHz Switch-

Selectable Speed

\$1195

• 1MR RAM

Enlarged Enter and Shift keys for aasy HILLIAN TO THE

101-Kev keyboard with

101-kay anhanced twelve function \$69 kays . . .

Standard Turbos Eight Expansion • 5060, 5151, or

101-Key Enhanced 8088 Processor Keyboard 360KB Diskatta (vour choica) Drive With One-Year Limited Controller Warranty

Turbo/10 4.77MHz-10MHz

Processing Spead • 640KB RAM Turbo/8

 4.77MHz-8MHz \$449 Procassing Speed • 256KB RAM



CompuAdd. a standard for mail-order

excellence since 1982. Call for a free Catalog: 1-800-666-1872

'Personal Computer Products"

12303-G Technology Blvd. Austin, Tx. 78727

Switch Boxes

Manual (25-pin) 2 Computers, 1 Peripheral 2 Computars, 2 Peripherals 3 Computars, 1 Peripheral . . 4 Computers 1 Peripheral (36-pin version also available.) Automtte (25-pin)

4 Computers, 1 Peripharal 8 Computers, 1 Peripheral valiable for serial or namile()

STARTER KITS.

For Everything You Need To Begin Serious Computing Immediately!





Professional Starter Kit

Career Starter Kit

\$865

Computer-286/10 system with 80286 processor (with switch selectable 6MHz/10MHz processing speeds), 512KB RAM (expendable to 1MB on motherboard), 8 expansion slots, 200-watt power supply, 1.2MB floppy drive, your choice of keyboard, dual floopy/herd drive controller, clock/calender with battery backup, and system reset button.

Monographics Video-High-resolution (750 pixels × 350 lines) ember monochrome monitor with 12" screen, monochrome graphics card with parallel port.

Hard Drive- 20MB hard drive, fully installed.

40MB Hard Drive Option-Upgrade your 20MB hard drive to a 40MB, fully installed for only \$125 above the base price Printer-Epson® LX-800 with draft (150-180CPS) or neer letter

quality printing, multiple typestyles, Epson character graphics set, dot graphics capability. Software-Professional Zen Software, e totally integrated software peckage: ZenWord ", ZenCalc", and ZenLink MS-DOS®

operating system, GW BASIC° programming language, and PC FullBak backup utilities also are included. Accessories-200 sheets continuous form paper, printer cable, and 10 double-sided, high-density blank diskettes.

Professional Starter Kit EGA Industry-standard 14" tube size EGA monitor EGA card, and I/O card with serial and parallel ports . \$1915 Computer-IBM® -compatible Standard Turbo/10 computer with 8088 processor, keyboard-selectable 4.77MHz or 10MHz processing

speeds, 640KB RAM, half-height 360KB floppy drive, floppy drive controller, 150-watt power supply, your choice of keyboard, and system reset button. Monographics Video-High-resolution (750 pixels × 350 lines)

ember monochrome monitor with 12" screen, monochrome graphics card with parellel port.

20MB Hard Drive Option-Add the storage power of e 20MB hard drive to your Career Starter Kit. Fully installed for only \$269 above the base price. Ontion includes PC Fullbak backup software

Printer-Star Micronics NX-1000™ provides software compatibility. plus 120cps draft and 30cps neer letter quelity printing, multiple type styles, nine-pin print heed, Epson LX-800 and IBM Proprinter IIº emulation, dot graphics capability, and tractor/friction paper feed. Software-Professional Zen Software, e totally integrated soft-

ware package: ZerWord, ZenCalc, and ZenLink. MS-DOS operating system, and GW BASIC programming language also are Included. Accessories-200 sheets continuous form paper, printer cable,

and to double aided, duable density blank d Career Starter Kit EGA stry-standard 14" tube size EGA monitor

EGA card, and I/O card with serial and parallel ports . \$1265

PS/2® Products

Orchid RamQuest 50/60" 2MB of

EMS memory, Lotus/Intel/Microsoft compatible . Everex Evercom # 24" 2400 baud internal modern with BitCom software, includes

auto-answer and auto-voice switchover \$179 Taxan TDM-5™ External Floppy Drive allows PS/2 models to read 5.25" diskuttes.

360KB format compatibility

Office Facsimiles

Sharp FO-150 high speed. 6 shading levels, auto contrast, huitin nhone Sharp FO-210 features above plus autofeed and speed dialing

\$1399

Floppy Drives



360KB for PCs/XTs (black) 360KB for Alls (gray) 720KB. 35" for ATs (gray)

\$135 ORDER TOLL

\$109

\$115

Printer Supplies 64KB Print Buffers 1 Computer, 1 Peripheral \$63

2 Computers, 1 Peripheral 256KB Print Buffers 1 Computers, 1 Peripheral \$135 2 Computers, 1 Peripheral (Centronics parallel interfaces.)

Print Mufflers 80-column (19" × 16" × 8.5") \$45 132-column (26" × 16.25" × 8.5") . . . \$59

"Personal Computer Products

12303-G Technology Blvd. Austin, Tx. 78727

Telex: 763543

1.44MB, 3.5" for ATs (gray)

Outside USA: 512-258-5575

GREAT BUYS

On Brand Names Including MiniScribe, Seagate, AST, Panasonic, and More!

Mass Storage Hard Disk Drives

\$1599



CDC Hard Disk Drive 18ms Access Time ESDI-Certified Hard Drive

- 10Mbit Per/Sec ESDI Dual Hard Drive/Floppy Controller
- 1:1 Interleave Controller 150MB ...

Maxtor Hard Disk Drive

- 16ms Access Time ESDI-Certified Hard Drive 10Mbit Per/Sec ESDI Dual Hard Drive/Floopy Controller
- 1:1 Interleave Controller 338MB\$2575

	A	5T °	
ACT 01-0	to December	" OF OLO	

RAM. Serial. Parallel Port. Clock/Calendar . . . \$197 AST Advantage 128KB RAM, Serial, Parallel Port \$228

AST Rampage® 2 64KB RAM for the IBM® PC \$229

· Backs Up and

WESTI AKE DATA

For ATs® andCompatibles



- . One-Year Limited Warranty . Linear Voice Coil Closed Loop Servo System . Whitney Technology and Sliders Faii-Safe Automatic Actuator Lock
- . Low 14-Watt Standby Power 43MB (25ms) . . .
- 110MB Price Reduced (28ms, RLL Controller) \$1125

For PC/XTs®,



- Mounting Hardwar Western Digital® Controller
 Complete, Illustrated Installation Manua
- 20MB MiniScribe (65ms) ... \$279 30MBSeagate (65ms) **40MB** MiniScribe Price Reduced! (61ms) . . \$379
 - 20MB for Compag Portable\$299

\$59.95 Value

" Hard Disk

· Can Boot From

ORCHID'

Tiny Turbo 286" Uses 80286 Processor

· Keeps 8088 in System Processor Salactable to Ensure 10086. Compatibility

Optional 80287 Math Coprocessor

\$299

Printers Panasonic 1091i 80 columns, 160cps draft, 32cps NLQ	\$199
Okidata® 192+ 80 columns, 200cps draft, 40cps NLQ	\$329
Epson FX-286e 132 columns, 240cps draft, 48cps NLQ	\$482
Epson LQ-1050™ 132 columns,	\$818

FlashCards™

Editor's Choice PC Megazine Vol 6-3





\$749

PC-FULLBRK

With Every Hard Drive

From DOS

or FlashCard Purchased

• Menu-Driven or Use

 Western Digrtaful Controller One-Year Limited Warranty

FlashCard · Shock Mounted Installs in Minutes

FlashCard-20™ (MiniScribe, 65ms) \$319 FlashCard-30[™] (MiniScribe, 65ms) . . \$339

ahlas

Parallel Printer Cables
6' (DB25M to C36M)
10° (DB25M to C36M) \$11.95
6' for Tandy 1000
AT Serial Cables
6' (DB9F to DB25M)
10' (DB9F to DB25M) \$10.95
XT Serial Cables
6' (DB25F to DB25M)
10" (DB25F to DB25M) \$10.95

moufidd Personal Computer Products

12303-G Technology Blvd. Austin, Tx. 78727

Cables

6' (DB25M to DB25F \$7.95 10' (DB25M to DB25F) \$10.95 6" (DB25M to DB25M) \$7.95 10' (DB25M to DB25M) \$10.95 Centronics® Cables 6' (C36M to C36F) 10' (C36M to C36F) 6' (C36M to C36M) . 10' (C36M to C36M) \$13

SKILL AND RELIABILITY

That's Made Seagate the World's Leading Supplier of 51/4" Hard Disk Drives!



40MB The Seagate ST251-1 hard disk drive combines AT-class performance with state-of-the-

- effective hard disk drive. 28ms Average Access Time
- 12 Watt Power Consumption · Free Disk Partitioning Software Included for

art technology for proven reliability in a cost-

- Easy Integration
- 52,224 Bytes per Cylinder Standard ST412 Interface
- · Auto-Park With a Balanced Positioner, Eliminating the Need for a Locking Mechanism
- · Sputtered Thin-Film Media Technology
- Custom-Designed, Illustrated Documentation

\$249

. For Your AT® or Compatible Reliability Assured

Only...\$459

80MB For data-intensive applications, Seagate's 80MB (formatted) ST4096 hard

drive delivers the reliability, dependability, and cost-effectiveness that you expect.

- 28ms Average Access Time 78.336 Bytes per Cylinder
- Standard ST412 Interface
- · Free Disk Partitioning Software Included for Easy Integration
- Linear Voice Coil Actuator Ensures Precise Performance
- Custom-Designed, Illustrated Documentation . For Your AT® or Compatible
- Precision Produced

Price Reduced! Only...\$745

Plus...vour bonus from CompuAdd when you buy any hard drive; PC FullBak backup software, selected PC Magazine Editor's Choice among backup software May 31, 1988. "Its ease of use and low price make it an specially good value." - David DeJean, PC Magazine

If you want Seagate quality in a high-capacity drive, call CompuAdd toll-free at 1-800-666-1872.



65ms average access time.



12303-G Technology Blvd. Austin, TX 78727



512-250-5760 Outside USA

SOFTWARE SPECTACULAR!

A Sensational Selection of Popular Software



The Print Shop* by Broderbund prints everthing from ners to bulletins with

dazzling designs and graphics. Includes eight for and dozens of borders, background patterns, and graphics.	
Limited-Time Special Low Price!	\$32
Communications Carbon Copy Plus Carbon Copy Plus (35") Smartcom II CompuServa Subscription Kit Crosstalk XVI	\$110
Compilers and Langua Cipper (Summer '87) Microsoft Compiler Microsoft COBOL Compiler Microsoft TORITHAN Optimizing Compiler Microsoft Microsoft Ausor Assembler Microsoft CusckBASIC Compiler Microsoft CusckC Turbo BASIC Turbo BASIC Turbo C Turbo C Turbo C	\$394 \$300 \$467 \$300 \$100 .\$61 .\$66 .\$57 .\$63
Data Bases dBASE III+ Microsoft Works Pers Professional File OBA Rapidfile R-Base for DOS (Single User)	\$199 \$209
Desktop Publishing	0040

Hardball. Aldus PageMaker \$545\$36 Microsoft Chart \$263 PFS: First Publishar\$57 PFS: First Publisher Printmaster Plus \$30 Ventura Publisher \$529 Educational Pirates . earning DOS



Typing Tutor IV® by Simon & Schuster dramatically increases your typing speed and accuracy. This unique interactive program drills, tests, and evaluates your keyboard skills.

Limited-Time Special Low Price! \$28
Math Blaster Plus! \$29
Math Maze \$20
Raadar Rabbit (Regular Price) \$25
Typing Tutor IV (Regular Price) \$32
Typing Tutor IV (3.5") \$34

Financial Dac-Accounting Accounting Lits\$113 Dac-Easy Accounting \$57 Dac-Easy Light \$40 Dac-Easy Payroll \$40 Maneging Your Money \$125 Quicken\$28 Svivia Portar's Financiel Planner \$55 Sylvia Portar's Swittax 540

Ancient Art of War at Sea . . \$25 Balance of Power . \$28 Bard's Tale \$30 California Games . \$23 Chessmaster 2000 . \$24 Chuck Yaager Flight Trainer \$24 Earl Waaver Baseball . . . \$24 F-15 Strike Eagle F-15 Strike Eagla \$25 Falcon \$25

Helicopter Simulator \$28 Ikari Warnor \$23 Jeopardy Jet . Leisure Suit Larry . . . \$23 Mean 18 Golf\$20 Mean 18 Course Disk \$10 NBA\$21

. \$23



Wheel of Fortune™ by ShareData, Inc. lets you be a contestant on the game show that took America by storm! Spin the wheel, buy your letter, and guess the pay-off phrase on the game board.

Limited-Time Special Low Price! \$6.50 Scanary Disks for Scanary Disks for Flight Simulator and Jet\$16 Test Drive . . . Wheel of Fortune/Regular Price) \$7 Where in tha USA is Carman Sandiego \$30 Where in the World is Carman Sandiego \$30 Wizardry: Proving Grounds . . \$34 World Games\$25 Wrath of Nikademus \$22

Graphics Boeing Graph \$199 Certificate Maker \$25 Chartmastar \$222 Freelance Plus (3.5") \$343 Harvard Graphics \$279 Print Shop (Regular Price) \$38 Print Shop Companion . . . \$28 Windows Draw \$169 Windows Graph \$249 Gauntlet \$23 Organizational Harvard Total Project . . . \$20

Timeline \$280 Timeline (3.5") \$280 Spreadsheets Enable \$394 Framework \$345

Microsoft Excel\$330

Microsoft Multiplan \$130

PFS: First Choice

* SPECIAL *

Reader Rabbit™ by The Learning Co. for four-to ten-year olds, keeps your child's attention with captivating graphics as it teaches reading, spelling, and memory skills. Limited-Time

Special Quattro\$159 Surpass \$339 Symphony (3.5") \$468 VP-Planner \$55 Utilities Copy II PC \$23 DESQview \$74 DESQview (3.5") \$74 Disk Optimizer \$39 Fastback \$92 Fastback Plus \$95 Fastback Plus (3.5") \$95 GOfer \$40 Maca Utilities \$50 Microsoft Windows \$66 Microsoft Windows 386 \$130 Norton Utilities PC-FulBak \$49 PC Tools Deluxe \$40 SideKick . \$50 Sideways . \$40 XTREE\$35 Word Processors

Bank Street Writer Plus \$45 \$50 MultiMata Advantaga \$269 Network Word \$100 PFS: Professional Write . . . \$115 Q&A Writa \$106 Websters New World

\$219

Professional Thesaurus \$76 WordPerfect (Version 5.0) Limited-Time Special WordPerfect (3.5") \$214 Word Perfect Executive . . . \$110 WordStar Professional \$239 WordStar 2000+ Personal

ENHANCEMENT ENERGY

Brighten It Up, Speed It Up, Talk It Up With CompuAdd-Ons

Monographics Video



Text Mode 80 Columns x 25 Rows, Graphics Mode 720 Pixels x 348 Lines, Parellel Port . . Mono Combo

Flot Screen With Tilt & \$65 Swivel Bese Monographics Card and Monitor

\$139

\$95

640 Pixels x 350 Lines 256KB Display RAM

Resolution **EGA Combo** and Monitor

EGA Video

Ultimate EGA Video

14" Tube, High \$349 \$469



640 Pixels x 480 Lines,

Up To 256 On-Screen

Colors, 132-Column

VGA Video Color Clarity

Zenith VGA Analog Monitor 640 Pixels x 480 Lines.

Charge Card

CHARGE CARD 286

31mm Dot Pitch 14" Tube, Flat Tension \$220 Mask Technology ... Hi-Res VGA Combo VGA Card and \$915

Video 7º Vega Deluxe 640 x 480. EGA. Color. and Monographics Standards, Ultra-High \$249 Resolution, 31mm Dot Resolution Pitch, 14" Tube Size

Internal Modems

NEC Multisync III Up to 800 x 675

Ultimate Combo Video 7 Deluxe and \$869

VGA Cards

- · IBM® VGA NEW Compatible Up to 800×600 Resolution
- Software Drive · Long-Term W

Vega VGA from Video Seven \$299

80286 Processing the PC

AT-MFC

1200 Baud Everex . 2400 Raud Standard \$139

1200 Baud Standard

Memory Cards

...\$69

599

EMS PC w/OK . \$119 EMS AT WOK

External Modems



1200 Baud Standard . . \$89 2400 Baud Standard .. \$159 2400 Baud Everex ... \$239 I/O Cards

Seriel & Parellel Port...\$59

Calendar & Game Port \$65

512-258-5575



VGA Plus from Paradise \$269

PC/XT® Multifuction Card 384KB RAM, Parallel Port, Clock/Calendar Game Port, Serial Port, and Software for PCs or Compatibles \$199

AT* Multifunction Card Up to 1.5MB RAM Expansion, Seriel & Parallel Port for ATs and Competibles w/0K \$110

FREE 30-day, money-back guarantee
 FREE credit card ordering — no surch

 FREE one-year limited warranty
 FREE one-year technical phone su MasterCard, VISA, money orders, certified ch am order), company and institutional purchas \$50 militarum cross; company and mandring (minimum \$2). All return items must be accompanied by a Return 6dd 2% per order for phipping and handling (minimum \$2). All return items must be accompanied by a Return 6dd 2% per order for phipping and handling (minimum \$2). All return items must be accompanied by a Return 7dd 2% per order for phipping and handling (minimum \$2).



PC I/O

Also Has Clock

512-250-5760

dBASE® Users: New If you don't use R&R. you're wasting your time!

Version 3 Network Support.

More than 100 Enhancements.

Occumer 17, 1968

It's a fact. With R&R you will prepare reports two to ten times faster than by dBASE

programming. That's what independent reviewers and R&R users say. And we guarantee that you will be satisfied.*

R&R has the power, flexibility, and ease-of-use to help you do reports like these, and virtually any others, quickly and without programming.

Power to relate and report from up to 10 files at once using one-to-one and one-to-many relations. Flexibility to place text and fields anywhere. Ease-of-use of Lotus®-like menus.

Power of more than 75 functions for calculated fields. Flexibility of report, page, and group headers and footers. Ease-of-use of standard field formats such as currency, commas, and word-wrap.

R&R has hundreds of features to ive fast results. Eight sort levels Eight group levels. Totals, subtotals Memo field support including query, merge, and word-wrap. Printing in underline, bold, italics, and different

So Relate & Report, then rest and relax with R&R

50 Statements 947 79 97 9 1019 Banks (80) nployee Lists

	Atto	DE NO. PE SO.	Division Cons	Scotto Milleros	good Food Sue
ces	9		R Gifts, Inc.	\$1,365 E7 \$750 60	115
one ridge Arthus tile, ff dead	Ora Out		No00	62, M2-66 St. AME 60	30
Description	Susmitte .	West, Prior	-		no immediately
a Bormaned Pottery	24	4.80	\$176.00	Yery trucy y	
	٦.		\$000.00	9 Rosel	
ENTERENT	- 1	10 00	2100 00	treest a tel	itections
10 10 10 BM	-1	Beltistel	\$509.80		
10 M.W.		dume Francount A Ton on F 58 and bandling	(20.34) 87-83 6 27	ZYBOAR	DS Unlimited
200	-1	1954	\$343 PE	_	

Form Letters

Only \$149! Satisfaction Guaranteed.*

To order, or for more information and the name of your nearest dealer,

800-325-9035 In Mass., call (617) 366-1122

*If you aren't satisfied for any reason, return R&R within 30 days of purchase for a full refund (if purchased directly from Concentric or a Concentric Authorized Reseller). R&R works with dBASE III®, III PLUS®. Quicksilver's, dBXL's and other dBASE-file-compatible products. Clipper** and FoxBASE+** Module \$49.95 additional, 3.5" media available at extra cost. Runtime included with unlimited use license.

"... a stunning combination of a comfortable and informative user interface, supremely easy access to multiple elated files, and extensive report design and enhancement tools. Usable by novice and expert alike, it is superb for generating either straight-forward or complex report outs Editor's Choice PC Magazine, 12/8/87 The [time] savings we gained with

True Lancemen

InfoWorld, 5/25/87

"The consummate dBASE report PC World, 3/87

... run, don't walk ... and place your order

PC Week, 11/11/86

Report Writer

Concentric Data Systems, Inc. 18 Lyman Street, PO Box 4063, Westboro, MA 01581

rademarks: dBASE, dBASE, III, dBASE III PLUS by Ashton-Tate. Lotus by Lotus Development Corporation. Juckshiver, dBXI, by WordTech Systems, Inc. FoxBASE+ by Fox Software. Clapper by Nantucket Corporation. IAIR Ratational Report Winter by Concention. Deta Systems, Inc.

FORMATTING TEXT WITH

tyle Sheets are one of Microsoft Word's best features and one that distinguishes Word from other professional and corporate word processors. What are they? A Word Style Sheet, basically, is a group of format specifications, or styles, stored in a file. It is available for use in any document you create using Word.

By itself, that may not sound terribly useful. If you've ever tried to maintain formatting standards in a large word-processing workgroup, however, you'll find the concept very appealing. Any time you revise the standard, you can easily make an update to a master Style Sheet and copy it to every user's system. And if you're using the network version of Word, all you have to do is change the master Style Sheet

stored on the network file server.

Another excellent application of Style Sheets is maintaining a set of formatting standards throughout a large project you're doing by yourself. While writing the book Fast Access/Microsoft Word, for example, I used one Style Sheet containing fewer than 30 format specifications (or styles) to format the more than 75 document files I used to construct the manuscript.

I begin here by explaining basic Style Sheet principles and showing you how to create styles and a Style Sheet using the FORMAT STYLESHEET RECORD command. Next comes how to use the styles and attach a Style Sheet to other documents. Finally, I cover the Word Gallery subcommands, which can help you maintain a more fully powered Style Sheet.

One of Microsoft Word's most distinguishing features. Style Sheets offer easy maintenance of text-formatting standards

and allow swift changes that leave other word processors in the dust.

■ MICROSOFT WORD STYLE SHEETS

STYLE MANAGEMENT Other word processing products, among them Lotus Manuscript, Volkswriter, and Total Word. use externally stored format specifications. They are even called style sheets. In those products, however, the style sheets are usually tied to particular types of documents or sections of documents. And each format style found in these products' style sheets contains the entire character and paragraph specifications for a block of text, such as a paragraph or group of paragraphs, or a document section, such as a chapter or subchanter.

When you use Word, on the other hand. any style in any Style Sheet can be used anywhere in any document. Also, the styles contained in a Word Style Sheet are individually defined for character formats, paragraph formats, and division formats. (Division formats govern page and column layouts in Word documents.) Once they're defined, you can mix the styles up however you like when you apply them to the text in your documents.

A Style Sheet can be attached to any document and to any number of documents; accordingly, you can reformat any document by changing the Style Sheet that's attached to it. You can also reformat several documents by revising the styles in a Style Sheet that governs all of them. In

a document's format on a macro level.

Word supports mixing Style Sheet formatting and direct formatting in the same document as well. While, in general, mixing the formatting methods makes a document less maintainable. Word 4.0 makes things easier with its FORMAT SEARCH and FORMAT REPLACE commands. These make format maintenance easier under almost all conditions.

The only restriction on all this activity is that all styles used in a document must be contained in one Style Sheet-simply put, you can attach only one Style Sheet at a time to a document. That is not a serious restriction, however, because Word allows you to merge Style Sheets and bring styles from several different ones together.

DIFFICULT YET REWARDING Word is known as a good, if somewhat arcane, word processor, and Style Sheets have been among its more difficult features to product, including what programs to run and what data to use. Test programs which are written by Laba staffers and data are always supplied to reviewers on disk to guarantee uniformity. The only time data or programs are input by hand is when limitations in your product require reviewers to do that, or when it is in the nature of using the product to test it by imputting data by hand. in such cases. To this benchmark proposes are satisfied to the general patter until only approximation—to the Clabb Benchmark Disk and the near PC Laber LAW Benchmark Disk and the near PC Laber LAW Benchmark Disk has defined on the first will be an allels at Spring Condex. To the extent possible, all products in a class new tested on the extent possible, all products in a class new tested on the extent possible, all products in a class new tested on the extent possible, and the products of the extent possible of the extent possible of the products of t

PC1. DOC:

OMMAND: Copy Belete Format Gallery Help Insert Jump Library Options Print Quit Replace Search Transfer Undo Window Edit document or press Esc to use menu Pg2 Li18 Co28 ()

uned

Microsoft Word's Style Sheet can be displayed for viewing and editing in the Gallery subsytem window (see below). This window shaws users the technical specifications for both the IT charocter style and the SP paragraph style; specifications for paragraph styles include font information for that style's default character format. Styles can be created and modified either by using the editing tools in the Gallery or by using the standard editing tools that can be found in Word's editing windows. The IT character style was applied to the text in the standard Word editing window (see above) by highlighting the text block, then pressing Alt-I-T. The SP parograph style is specified as the Standard Paragraph Variant, which becomes the default parograph format for any document using this Style Sheet



What's the most logical way to connect everyone to a laser printer?







\$095

30,950

\$10,950

Most offices have only one laser printer. So user access can be a real pain. But a Local Area Network can cost twice as much as the printer. And buying a laser for each user is out of the question.

That's why The Logical Connection makes everyone happy. You, because the cost is low, your employees, because they each get a laser virtually at their fingertips.

With The Logical Connection you can put the printer in a central location. Users access it in seconds from their own terminals with the new,

Everybody's happy with the Logical Connection.

11200 Industriplex Blvd., Baton Rouge, LA 70899 SALES OFFICE: 1322 Bell Avenue, Suite IA, Tustin, CA 92589 (800) 225-2775 (714) 229-954 ical Connection is a trademark of Fifth Generation Systems, Inc. Dp-Up is a trademark of Popular Programs, Inc. simple and convenient, memory-resident, "Pop-Up; witching menu. Then, The Logical Connection takes over. If the printer is occupied, it holds each job until its current work is finished, automatically printing each new job in turn.

No wonder PC MAGAZINE has twice named The Logical Connection its Editor's Choice. In

Connection its Editor's Choice. In fact, they called it, "... more than logical — maybe inspired."



From Fifth Generation Systems
The makers of FASTBACK and FASTBACK PLUS

CIRCLE 288 ON READER SERVICE CARD

IT'S TIME TO ASK FOR SEIKOSHA.

You'll find printers that mean business.

Today, running a business is high technology, Every member of your staff... and that includes your critical equipment, must make every second of the business day as productive as possible. So when better printer technologies become available...you have to take the time to learn about them MAINSTREAM PERFORMANCE, CUTTING

ELOCA CUNANCES.

The bottom-line on any SEIROSHA printer is dependable performance. The top-line is new trinking and innovation. SEIROSHA is the only manufacturer offering 800 cps. 18-pin, single-head oth matrix printers; the SRP-10 Series. They're parallel, serial and IBM mini and main frame compatible. Plus they provide bar code label printing capability.

DEC compatibility is featured in the BP-5420 Series
—at 420 cps and 104 cps NLQ.

The Sk Series gives 9-pin, 300 cps printing (with optional color) at noise levels below 55dBA!

All-around performance with 24-pin letter quality is the hallmark of the St. Series. And it delivers up to 180

cps (draft) at a whisper-quiet 55dBA.

This Mailling PROVEN MILLIONS OF TIMES A DAY.
The most reliable printers in the world today, factoring in speed, versatility, availability and value, are dot matrix printers. They do more and cost less than any other technology. No one in the world makes more useful and

dependable dot matrix printers than SEIKOSHA. SEIKOSHA... THE NEW COMPATIBILITY

From stand alone desk-top systems to mega-network system integration, there is a SEIMOSTA printer that will improve the performance of any business in the country. We measure this improvement in steady high-speed only not a virtual freedom from downtime, outstanding support and perhaps the lowest dollar-per-million characters cost. ... ever

SEIKOSHA MEANS PRECISION MANUFACTURING

... FOR 100 YEARS.
This tradition of technological innovation and leadership has extended for over a century. Today it defines cutting-

CIRCLE 498 ON READER SERVICE CARD

edge products and technology in time measurement (in Seiko, Pulsar, Lorus and other brands), computer

products and in dozens of industries. Ask for SEIKOSHA. The printers that mean business.

Call toll-free 1-800-338-2609 or 1-201-529-4655.





See The Control of Subspace and Highly Shows See Title in required, as intel shows found using 148 3.8 is supplied, and shows found using 148 3.8 is supplied, and when a PSC suckine in required a foods of it used.

Mark results are seasonabled and published internally no revisioner can compare results for products they betted as used as the careful of the published in a close careful in a close careful in a close a compare results are published in surplus and tables in PC frontiers. However, all results can be used by the revisioners to sale the architecture in their revision.

Fig. fact, more than just PC Labe Reschareb texting post into the revision and without process and without by labe to sale the revisioners and without by labe to sale the revision and without by labe to sale the revision.

FIG. 2007.

All I december to press the to use seem

The SQ prompting the is a Variant the rout created by reformating. Simulated Perspaysh to Debased of the reformating the democratic to this server to be well-folded, and fully build
be FORMAT SYLLEMIEST RECORD command to place to new style into the Wood Gallery. When
FORMAT SYLLEMIEST RECORD command to place to new style into the Wood Gallery. When
FORMAT SYLLEMIEST RECORD command to place to new style into the Wood Gallery. When
FORMAT SYLLEMIEST RECORD command to place to new style into the Wood Gallery. When
FORMAT SYLLEMIEST RECORD command to place to new style also includes use of the IT character
on the new formatting characteristics. The above example also includes use of the IT character
style—it can be seen through the best build. The Sylle for the to be build in the supplementation for the style in the style for the Syllemian many initially
be required to the style in the style of the style in the style specification many initially
preferables as the Syllemian glow characterists.

if Character 1

Options Print Quit Replace Search Transfer Undo Window



leam. Microsoft addressed this difficulty implementing the FORMAT STYLESHEET RECORD command in Version 4.0 of Word. This command allows you specify directly a character, paragraph, or division format as you normally would using Word FORMAT subcommands, then to teach Word's Style Sheet mechanism about that forms.

The procedure for creating and using styles and a Style Sheet is conceptually simple and includes only five basic steps: i. Choose character, paragraph, and di-

vision format styles you want to use in your document. 2. Give each one a name and store them

in a Style Sheet.

 Apply the styles you have created and named to various parts of your text as you need to use them.

4. Save the Style Sheet on-disk.

 Attach the Style Sheet you have created to other documents needing the same styles.

In addition, you can modify the styles you create at a later time and create other Style Sheets for different purposes. You can even combine Style Sheets to create one that contains the best styles culled from several of them.

CHOOSING FORMAT STYLE Choosing the format style you want is no problem if you already know Word. For example, if you want to define a style for italicized text, start by doing the following:

Highlight a block of text you want italicized.
 Press Word's Alt-X-I Speed Formatting Key combination to italicize

the text.

If you are unfamiliar with Word's
Speed Formatting Keys, just use the Word

Speed Formatting Keys, just use the Word menu system to format the highlighted block in tallics. You can, of course, add any other character format specifications (such as font) that you'd like to include with this style. All you have to do is execute the appropriate Word formatting command or use the correct Speed Formatting Key combination.

The X key is a necessary addition to the key combination when using Speed Formation. Keys in commentum with Style

Italic Characters

■ MICROSOFT WORD STYLE SHEETS

Sheets. As you will see later, the Key Codes for styles also use Alt-key combinations, and the X key distinguishes the Speed Formatting Key Codes from your own styles' Key Codes.

NAMING FORMAT STILES Naming as great deal more complicated than it is. This is a Word style start on exacing as great deal more complicated than it is. This is because a style is nume has four components. Two of these are required in order to make it unique within your Style Sheet, and two are optional. The optional comprinents make styles casier to use method the optional components make styles casier to use method with the components in the style of the

Once you know what the name components are, you have to make use of them in the FORMAT STYLESHEET RECORD command. To continue the example:

{STEP} Place the highlight anywhere in the block of text you have italicized.

[STEP] Use the Word menu system to access the FORMAT STYLESHEET RECORD command.

FORMAT STYLESHEET RECORD will propose defaults for the Usage and Variant fields. The Usage proposal will always be "paragraph," and the Variant proposal will be the next available Variant in the Style Sheet you are now creating, it is usually best to accept Word's Variant proposal, but, at least in this case, you'll want to change the Usage from "paragraph" o "character." You'll also want to include a Key Code and a Remark.

{STEP} Type "IT" into the Key Code field. This is the two-character abbreviation that I always use for italicized characters.

{STEP} Move the highlight to the Usage field and type "C" to select "character" Usage.

{STEP} Move the highlight to the Remark field and type in "Italic Characters".

[STEP] Press the Fater key, and, believe it or not, you've just started your first Word Style Sheet.

Naming a	Word Style	

NAME COMPONENT PURPOSE

Key Code (optional)

Unique one- or two-character codes, which, in combination with Alt, apply a style. While using it is optional, you'll miss out on easy access to styles

if you leave it out.

Usage (required) Specifies type of text (character, paragraph, division) to which a style can be applied; one style cannot have more than one Usage. The exception is

paragraph styles, which include specifications for the paragraph's default characters along with paragraph format specifications.

Variant (required) A numeric code, or place marker, that makes each

style unique within its Usage.

Remark (optional)

Anything you want to say about how a style should be used (in 28 characters or less).

Figure 1: A style's name has four components, two of which are required to make it unique within your Syle Sheet. The optional components make styles easier to use; they also help make their intended use easier to remember.

One way to see what you're doing is to waite on Word's Syle Bar. Doisloned in the leftmost two-character positions of the editing window, displays the one- or two-character Key Code for each paragraph of division style in use. Unfortunately, the Syle Bar cannot also display the Key Codes for character as the Syle Bar displayed, use the Windows mean system to access the Windows mean system to access the NPL DOW OPTIONS command and set the Syle Bar displayed, use the Syle Bar displayed, use the Syle Bar displayed, use the Syle Bar displayed in Sy

ZOOMING AROUND THE MENUS Now that you've started a Style Sheet, how can you use it? Of course there's not much to the Style Sheet so far, but it can be useful. If there's another block of text you want to format in talkies, it's much easier to do it using your "IT" style than by using Word's menu system. Just try it:

{STEP} Highlight the new block you want to italicize.

{STEP} Press Alt-L then erress T.

Just like that, your block of characters

becomes italicized. The difference is that the block now has a style and a style name attached to it, not just a format. Later on you'll see how important that can be. If you have the Style Bar switched on, it will display the IT Key Code.

The FORMAT STYLESHEET command can also be used to apply a style. It can be cumbersome, but some people use it. And if you decide to omit Key Codes from your style names, you must use it.

Begin by highlighting the block you want to italicitie as before. Then, use Word's menu system to access the FOR-MAT STYLESHEET command. Press C to specify a character style, and enter either the IT Key Code or the Variant number into the field. If you can't remember the Variant or Key Code, just press FI to see a list of character syles in your Style Sheet.

You probably have several paragraphs in most documents that are formatted in the same way. This includes margins, line spacing, indents, and usually the character four year life to use next of the time. This is your "default" format. Word's Style Sheet system has a way of giving such a

Insist on a Sysgen 51/4" drive for your PS/2.

Here's why:

A Sysgen™ Bridge-File™ gives a PS/2™ full access to your current data and software, with unparalleled 51/4" disk drive performance and reliability. You get: A larger capacity drive. Two modes - a 360Kb and a powerful 1.2 Mb - assure you comprehensive transfer capabilities and convenience for total office needs. Others, like IBM®'s, offer only 360Kb. Proven reliability. In fact. Syspen is the choice of over 100,000 satisfied Bridge-

Bridge-Tape.™ (As a Bridge-File owner, you receive a

total savings of \$135 on Bridge-Tape!) What's more,

File and tape back-up users. No slot loss. The Sysgen 51/4 drive adapter card doesn't take any additional slot space. IBM's does, Builtin flexibility of an external connector. You can add another Bridge-File drive or

Sysgen's high-performance tape back-up system,

Sysgen's footprint is smaller. A full 50% smaller than IBM's. For the best PS/2 access to 51/4" disks, and the best value at only \$325, insist on Sysgen Bridge-File.

Sysgen offers the only complete family of data transfer products: Including the 31/2" Bridge-File floppy disk drive, for transferring information from any PS/2 to any PC. And the Bridge-Tape subsystem that's

PC and PS/2 compatible, giving you total tape back-up and data transfer flexibility.

Call for Sysgen literature or for the location of the Sysgen dealer nearest you.

INFO HOTLINE 1-800-821-2151

16) 263-4411. © Copyright Sysgen, Inc., I marks PS/2 — IBM Corporation, System, Bridge-Tipe, Bridge-File — System, Inc. Registered trademarks: IBM — IBM Corp CIRCLE 173 ON READER SERVICE CARD

default format a special status, called "Standard," and it's implemented as part of the style name Variant. To see how it works, format a paragraph in your standard style, then do the following:

{STEP} Place the highlight anywhere in the paragraph. {STEP} Use the Word menu system

(STEP) Use the Word menu system to access the FORMAT STYLESHEET RECORD command.

(STEP) Enter a two-character Key

{STEP} Enter a two-character Key
Code (I suggest "SP" for "Standard Paragraph").
{STEP} Move the highlight to the
Variant field, then type the word "Stan-

dard". {STEP} Move the highlight to the Remark field and type in "Standard Paragraph".

{STEP} Extend the highlight across a block of paragraphs you want to have formatted using the Standard style. {STEP} Press Alt-S, then press P to

apply the style.

You've probably noticed that any paragraphs included in the highlighted block that were not formatted the same way acquired your Standard format as soon as you pressed the Alt-S-P key combination.

SAVING YOUR STYLE SHEET The casiest way to save your Style Sheet is to shift your operation to the Word Gallery subsystem. Prior to Word 4.0's release, the Gallery subsystem was the only way you could create and maintain styles. It's still the best place to do maintannee work, and it is the only place where you can perform Style Sheet file maintenance.

Maintaining Your Word Style Sheet

GALLERY SUBCOMMAND

PURPOSE

COPY (Alt-F3)

Copies highlighted style into Gallery Scrap. Works exactly like Word's editing COPY command but applies to styles, not text. Gallery Scrap resembles Word's ordinary Scrap but is reserved for styles. Gallery Scrap is cleared when you EXIT

resembles Word's ordinary Scrap but is reserved for styles. Gallery Scrap is cleared when you EXIT the Gallery subsystem but is not cleared when you TRANSFER LOAD a different Style Sheet into the Gallery subsystem.

DELETE (Del key)

Deletes highlighted style into Gallery Scrap. Works exactly like Word's regular DELETE command but applies to styles, not blocks of text.

EXIT

Leaves Gallery subsystem and returns to the Word editing environment.

FORMAT

Provides all formatting tools commonly used in direct formatting commands. Galley PORMAT of mands while using direct formatting in the Word editing environment. Restrictions exist on the type of formatting available for each sply: Character styles are limited to the FORMAT CHARACTER command. Paragraph styles can access FORMAT CHARACTER, FORMAT PARAGRAPH, FOR-MATTAB, and FORMAT BORDER commands.

Division styles can access FORMAT DIVISION subcommands.

Figure 2: Once you're accustomed to using Sole Sheets, it becomes easier to maintain them using the Gallery subcommand system. These familiar-sounding commands operate somewhat differently here than they do in the standard Word environment.

The Gallery subsystem is a set of commands designed to help you create, modify, and maintain Word Style Sheets. Word does not differentiate between styles created using FORMAT STYLESHEET RECORD and those created using Gallery subcommands: as a result, the Gallery subcommands and be used to maintain any styles you create using the FORMAT STYLESHEET RECORD.

Use the Word menu system GAL-LERY command to get to the Gallery subsystem. When you issue the GALLERY command, Word takes you to a separate editing screen where your styles are presented in very technical-looking terms. These terms, in reality, are just compact notations for the very ordinary formatting specifications for each style. A careful reading of the two styles you just created will prove this to you by showing you the formatting you just specified in Gallery's own special language. You shouldn't have any trouble understanding it.

Beneath the screen is the Gallery subcommand menu; you'll find it resembles the regular Word command menu. In fact, all but one of the Gallery subcommands—and subcommands of these have exact duplicates in the general Word command system. The difference is that Gallery subcommands are applied to styles HELP

Brings you into Help subsystem at the start of section on Style Sheets. Entire Word Help subsystem can be used like any other Word command.

INSERT (Ins key)

Inserts style currently in the Gallery Scrap or creates and inserts an entirely new style. If you are using Ins-key version, the first option is the only one

NAME

Used to rename style. The NAME subcommand can modify Key Code, Variant, and Remark com-

that works.

ponents of a style's name.

PRINT

PRINT PRINTER for Style Sheets. Style Sheet will be printed in format displayed on-screen using printer's default font. Otherwise this command operates exactly like PRINT PRINTER. Style Sheets cannot be printed to a file.

TRANSFER

Has nearly as many subcommands as regular Word TRANSFER command and offers quick-key alternatives. Among them, LOAD brings Style Sheet into the Gallery editing environment. SAVE stores Style Sheet currently in the Gallery editing environment on-disk. CLEAR erases Style Sheet from the Gallery editing environment. DELETE erases specified document from disk.

UNDO

Reverses effects of last Gallery editing command. Works exactly like UNDO in the Word editing environment.

and to the Style Sheet that contains them, rather than to documents. That gives some of them subtly different meanings that are easy to understand and work with

The first item on your agenda is to save the Style Sheet you have created so far. Word aficionados will have no trouble recognizing the Gallery TRANSFER subcommand and will immediately guess that the TRANSFER SAVE subcommand is what they're looking for.

You can use the Esc-key method you are so familiar with from using Word to access the TRANSFER SAVE command or you can use the equally familiar Ctrl-F10 quick-key command to access TRANS-FER SAVE. In either case, you'll need to enter a name for your new Style Sheet. As with Word documents, you can call it anything you want. Word will supply an .STY filename extension for you, or you can use

another extension if you prefer.

ATTACHMENT AND MAINTENANCE You'll want to attach the Style Sheet you've created when you're starting a new document with Word. The FORMAT STYLESHEET ATTACH command will take care of that. Just use the Word menu system to access the command, then type in the name of the Style Sheet you want to attach or use F1 to list the available files, just as you would with the TRANSFER LOAD command for documents. As an alternative, you can shift into the Gallery subsystem and use its TRANSFER LOAD command to attach a Style Sheet to your

document. While FORMAT STYLESHEET RE-CORD is fine for creating styles and adding them to a Style Sheet, once you're accustomed to using Style Sheets it becomes easier to maintain them using the Gallery subcommand system. Because the familiar-sounding commands often operate differently here than they do in the standard Word environment, you will find it useful to consult Figure 2, which lists each Gallery subcommand and tells you what it

One hint: If you want to apply the same format to a group of styles, you can use F6 to extend the highlight across a group of styles, much as you would use it to extend the highlight across a group of paragraphs. This is a particularly handy trick when you're changing the typeface for a whole Style Sheet. If you attempt to use this trick. however, you should not include Division Styles in the extended highlight because they do not include character specifications.

Try making a modified version of the SP paragraph style that has deeper indents and underlined text, as shown in the following example. You'll see how easy maintenance is in the Gallery editing environment. Start by making a copy of the SP paragraph format:

{STEP} Move the highlight (notice the entire style specification is highlighted) to the SP paragraph format. {STEP} Press Alt-F3 to copy the SP

style into the Gallery Scrap. Move the highlight to the di-{STEP} amond-shaped End Marker.

{STEP} Press Ins to insert the copy into the last position in the Style Sheet.

If you try to issue an EXIT command to leave the Gallery or TRANSFER SAVE the Style Sheet at this point, Word will prevent you from doing so because you have a duplicate style. To fix this, it is necessary to do the following:

Use the menu system to issue a NAME command that respecifies the Key Code to be SQ. To change the Variant, press F1 to see a list of the Variants and which ones are currently in use. Move the highlight to Variant 1, press F1 to leave enumeration mode, then move the highlight to the Remark field and change it to anything new.

FRIENDLINESS.

Easier to use than either [WordPerfect* or Microsoft Word*]:
Personal Publishing

PUBLISHING.

"Comes with all the additional software

"...All of the publishing capabilities most firms are likely to need."

FEATURES.

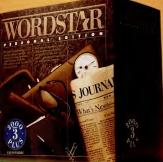
"...A clear winner in overall applica-bility...Ideal for corporate users..."

PRINTING.

.The best LaserJet* tout from any IBM

the most extensive of any

SPEED. "Faster word processor now



SUPPORT The best telephone

"A slew of useful add-on

HOT WORDS

Some of the brightest reviewers in the software business are giving their highest ratings ever to WordStar® 2000. In January InfoWorld awarded WordStar 2000 a

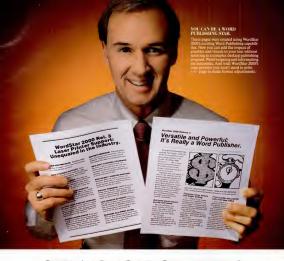
9.1, its highest rating for a word processor, and added that WordStar 2000 gives users "...an awesome features list, significantly improved performance, excellent documentation, and superior support."

InfoCorp says that WordStar 2000 offers "...a distinct speed advantage ... " And PC WEEK summed it all up by saving "MicroPro is offering a real bargain.

If you're ready to switch on the power of Word Publishing," you need to learn about WordStar 2000.

	Wortster	Microsoft	Word	Multimate
	2000 Plus	Word 4	Perfect	Advantage I
Ease of Use	Wery Good	Very Good	Very Good	Very Good
Technical Support	Excellent	Satisfactory	Good	Satisfactory
Support Policies	Excellent	Good	Good	Satisfactory
Value	Excellent	Excellent	Excellent	Satisfactory
Documentation	Excellent	Excedent	Excellent	Very Good
Speed	Good	Good	Good	Poor
Compatibility	Excellent	Satisfactory	Very Good	Excellent
Totals of all Categories	7.8	74	7.3	8.4

March 28, 1988 InfoWorld ranked WordStar 2000 as the top product.



STAR RESULTS

If you're looking for a powerful word processor that can help you make powerful communications, you've found it: WordStar 2000. It's a feature-nich word processor with the added ability to incorporate graphics right into your text. WordStar 2000 lets you add pictures to your words to create documents with the granhic immac of deskton publishinae.

the graphic impact of desktop publishing.
It's easy to learn and use WordStar 2000. And
when you have questions, MicroPro* offers the best
support in the business. Our toll-free lines operate
seven days a week.

We'd like to send you the word on WordStar 2000 and why it's right for you. For details and copies of the rave reviews, call 1-800-227-5609 (Ext. 465).

WORDST/1/R. 2000

WORD PUBLISHING POWER



A LAN version and a Legal Edition of WordStar 2000 are available

Weet Parkething as a trademark and Newsbar

and Macrofress regented inferences of Morebox international Corporation

Now you no longer have duplicate styles as far as Word is concerned since, by changing the name (actually all you had to change was the Variant and Key Code), you have eliminated the duplicate. Both styles, however, are still the same format; you'll want to change that:

{STEP} Use the menu system to issue a FORMAT PARAGRAPH command. Use the command to deepen the

paragraph indents.

{STEP} Use the menu system to issue a FORMAT CHARACTER command, and use the command to make the characters underlined.

CHANGING FORMATS Suppose you decide to use boldface text instead of italized text for emphasis. Ordinarily, this would be a problem because you may have several—possibly hundreds—of documents already formatted using italicized text for emphasis. Good news: If you're using Word Style Sheets, changing the format is no trouble at all. First, enter the Gallery subsystem as before.

{STEP} Highlight the IT character format.
{STEP} Use the FORMAT CHAR-ACTER command to change it to be formatted usine bold characters.

You will probably want to also use the NAME command to change its Key Code, but don't change its Key Code, to still be to the change its had the variant murber of New Men and the Command of the Command

Try one last exercise before moving on to a few more key concepts. It's probably unreasonable to have an underlined indentined paragraph style, though you probably want the indented paragraph. You probably also want to have a character style for underlining. Enter the Gallery subsystem as before.

{STEP} Move the highlight to the SQ paragraph style. {STEP} Use the FORMAT CHARACTER command to set underlined for-

mat to No. {STEP} Move the highlight to the di-

{STEP} Move the highlight to the diamond-shaped end mark. {STEP} Use the INSERT command

to start a new style. Give it a Key Code of UL, select character Usage, use F1 to select a Variant, and add a Remark that says "Underlined Characters".

{STEP} Use TRANSFER SAVE to save your Style Sheet, then use EXIT to return to the editing window.

Once you've determined that it worked, try your new styles out on some text and see if they do what you expect them to. If they don't, reenter the Gallery Subsystem and do some more maintenance work.

VARIATIONS ON A THEME Variants are the most important component of a style's name. The Variant is the part of the name that actually specifies the link between document text and the style specified for that text. In addition to the Standard Variant, Word offers a whole system of automatic style Variants that you can use to your advantage.

There are style Variants reserved for a variety of automatic applications—such as outline headings, page numbers, and footnote reference marks. Like the Standard Variant, they also have Variant names rather than Variant numbers. To use them, just type in the name of the automatic Variant rather than a number.

The Variants are automatic because Word defaults to using them in particular applications; their names will make their applications clear to you. Once you have selected specific formats for these Variants, characters or paragraphs will automatically take on the format specified by

Style Sheet Variants

AUTOMATIC AND ADDITIONAL USAGE VARIANTS

Character Page Number
Line Number
Footnote Reference Mark
Summary Information
25 Additional Variants

Paragraph Standard
Footnote
Running Head
Outline Heading Levels
1 to 7

Division Standard 19 Additional Variants

54 Additional Variants

Figure 3: Variants are the most important components of a style's name. The above table lists automatic Variants available for each Usage. It also lists the number of additional numbered Variants available in a Style Sheet for each Usage.

the correct Variant style whenever you indicate that they are to be used for that application.

If you specify, for example, paragraph of formats for each heading level in a Syle Sheet designed for outline documents, each heading vou type in will be automatically formatted according to your requiremers. The Word outline processor goes one step further. Whenever you change the style of a heading, it automatically changes levels to the level associated with its new syle.

Figure 3 lists the automatic Variants available for the character, paragraph, and division Usages. It also lists the number of additional numbered Variants available in a Style Sheet for each usage.

Keep in mind that the Variant you choose for a specified style can be one of the automatic (named). Variants in the Style Sheet, or it can be one of the openended (numbered) Variants. Each Style Sheet can have a grand total of 125 styles

Summary: Creating and Using Word Style Sheets

1. Choose character, paragraph, or format styles for use in document.

Highlight block of text to italicize.

Press Alt-X-l to italicize text

2. Name each format style and store it in a Style Sheet.

Place highlight in italicized block of text.

Use menu system to access FORMAT STYLESHEET RECORD command

Type "IT" or other representative code into Key Code field.

Move highlight to Usage field and type "C" to select character Usage.

Move highlight to Remark field and type "Italic Characters.'

Press Enter.

Highlight new block to italicize.

3. Apply the styles you've created and named to your text as needed. 4. Save Style Sheet on-disk.

5. Attach Style Sheet to

Press Alt-I, then press T.

Enter Gallery subsystem.

Use TRANSFER SAVE command to save Style Sheet.

Use menu system to access FORMAT other documents as needed. STYLESHEET ATTACH command.

Type in name of Style Sheet you want to attach.

Figure 4: The overall procedure for creating and using styles and a Style Sheet includes only five steps. You can later modify the styles you create and combine Style Sheets that contain the best styles of the bunch.

stored in it. I can't remember using more | ditioning. You never think about them unthan about 40, so you have lots of room to

move around and experiment. Figure 4 summarizes the steps for creating and using Style Sheets.

ONE LAST SHOT If you still think Style Sheets may be too hard to learn, try using one of the Style Sheets that Microsoft supplies with Word 4.0. There's SEMI STY and FULL STY for letters and memos, OUTLINE STY for outlines, and SAMPLE.STY, which includes a mélange of various styles.

til you start using them. Once you start, though, and formatting your Word documents becomes easier, you'll wonder how you ever lived without them.

John Dickinson is director of PC Labs. This article is adapted from the book Fast Access/Microsoft Word which Dickinson coauthored with Rhyder McClure. It is published by Brady Books, a division of Simon & Schuster Inc., One Gulf + Western Plaza. New York. NY 10023: (201) 767-5937. \$14.95. ISBN Number: 0-13-Style Sheets are a little bit like air-con- 307539-7.

NOVELL USERS

Eliminate repercussions caused by loss or damage to your keycard.

Run Novell worry free without the keycard.

The NetSafe program will allow Novell's Advanced Netware 2.0, 2.0a, 2.1, SFT & Microchannel to run without the keycard.

NetSAFE.

- provides protection and back up of your system
- frees a slot in your server
 - allows the server to exceed 12MHz bus speed

NetSAFE \$99.00 LIS

Visa. Mastercard or Amex plus \$10.00 handling

other products available for: CadKEY, Cadvance, P-CAD

NASDEC (Manitoba) Inc. 2704-85 Garry St., Unit 72 Winnipeg, MB Canada R3C455 (204) 956-2798 fax (204) 943-3702



CIRCLE 110 ON READER SERVICE CARD

Ten plugs for letting everyone use

the laser printer, the dot matrix, the daisywheel, the plotter or the modem anytime they want. Automatically! For 1/4 the cost of a new laser.

Spend \$525, save thousands Laser printers are expensive, but everybody wants share the same laser. The

one. Answer: let them all ame goes for other peripherals. The Buffalo* SX" does it all, and costs far less than the extra printer you won't have to buy!

Seves time like a LAW

Day in, day out, the Buffalo SX turns wasted hours into productive hours. No more plugging and unplugging cables, swapping disks, throwing

switches. No waiting. People just choose the peripheral they need and get on with the next job. Input and output are handled simultaneously, "on demand" at all ports

The most practical connection you can buy

Buffalo boxes do more

A 1,200 CPS printer That's what a computer than other sharing devices that cost 40% more per thinks it's hooked to when port. Just look at this it downloads data into the companson big buffer. Print jobs are

hice	\$525	\$595
otal Ports	10	8
ost/Port	\$5250	\$74.38
Max Output Ports	8	6
Aax Input Ports	7	6
Aax Senal Ports	5 (4 in or Out)	4 (In or Out)
Max Parallel Ports	5 (3 In or Cut)	4 (2 In, 2 Out)
Max Buffer	1 Mb	512K
oftware Upgrades	FREE user installable	\$50 factory installed
Inhtd Toll-Free Support?	Yes	No
Money Back Guarantee?	45 days	No

Print by menu Just select the printer from a

pop-up menu, using printer names you've chosen. Move the cursor to the one you want and hit Enter. Nothing could be simpler. RAM-resident software takes just 11K and works with text and VGA graphics displays like Ventura Publisher.*

ok almost anything to anything

PCs, Macs, minis and mainframes can share printers and exchange data with communications software

stored in order, and computers are freed up. People can go on to another job as the box spoon-feeds

data to the printers. Capacities range from 256K to 1 Mb-plenty for desktop publishing and big CAD drawings.

Instant installation Just plug in the cables and run the menu-driven installation software. The SX has ten ports-5 senal

and 5 parallel. Conversion is automatic. Connect 7 computers to 3 peripherals. Or 2 computers to 8 penpherals. Or any combination between. Printers can be 400 feet or more away

Expands as you grow SXs work together to make a large network, Reconfigure the ports or plug in more memory later if you change

investment. Proven customer satisfaction

your equipment. For fewer machines use smaller Buffalo boxes, starting around \$200. They all work together, so you'll never outgrow your More than 300,000 hoxes

are in use worldwide Our customers are happy because we make sure they're satisfied. Question? We answer it on our unlimited toll-free support line. Problem? We fix it free under a generous one-year

limited warranty Want to send it back? Within 45 days you can, for a full refund. \$100 software bonus With your order, we'll send free programs to speed

up your system: HyperDisk* disk caching; HyperKey* keyboard enhancer, and PrintBooster** for 1-2-3" They're yours to keep, even if you return the box.

RHFFAIN

Call now and talk to a person with the technical background to help solve your connectivity problems.

Buffalo Products, 2805 19th Street SE Salem, OR 97302 (503) 585-3414

CIRCLE 328 ON READER SERVICE CARD

Call accounting systems like Infortext's On-Site, Soft-Com's Scout, Telco Research's TRU, and Xiox's Large Business Series help link your PC to your PBX system to keep telephone costs in line.

CALL ACCOUNTING

TRACKING PBX COSTS

Are your office telephone costs skyrocketing? Call accounting software, which tracks phone calls and produces itemized call sheets (similar to the long-distance bills your telephone service sends to your home), lets you use a PC to configure your telephone network for economy and service, curbing telephone abuse, and allocating costs.

Call accounting programs, such as the four we review here—Infortex? On-Site Call Accounting System, Soft-Com's Scout, Telco Research's TRU System, and Xio's Large Business Series—seentially give your organization its own in-house telephone network management and internal billing system. This is just a selection of the available products. Two other big 1 vendors in this area, MicroTel and Moscom, did not submit products for review.

Service bureaus have been providing services to companies with private branch exchanges (PBXs) almost as long as PBXs have been in use. Using this approach, the company with the PBX usually must ship or transmit its call records to the bureau along with the necessary organizational directory information. The service bureau sends back the completed phone bills in about a week.

PC-based call accounting systems can outperform service bureaus in every area except up-front costs. The payback time for PC-based systems is short, and the quality of their output is high, but service bureaus do it all for one monthly fee.

WHEN YOU CALL FOR CALL ACCOUNTING . . .

A dozen things to look for when choosing a call accounting system.

You want to cut your telephone costs and you've decided the way to do it is to purchase a call accounting system. Now, how do you choose one?

Price, of course, is a concern. We all war a quick return on the investment. But you should also ask yourself "What kind of flexibility does this product have? How easily does it process special requests? Will it errow with our firm?"

Here are 12 key features to look for when choosing a call accounting system. You'll note the products discussed in this review possess most of them.

Account code editing. The consistent use of account code in professional cylic of account code in professional species simplifies the task of billing for the time professionals spend on the telephone. Many PBXs (private branch exchanged) allow you to lap a few extra numbers on the telephone keypad to record an account code on outgoing calls, but relatively few PBXs let the user enter an account code on foroming calls. The ability to enter account codes after receiving a count code and account codes after receiving call allowsy to to bill back almost over

Ad hoc reports A good call-accounting system should let you query the database with ad hoc requests (such as "Were any calls to area code 900 made today?") without either having to start a new collection cycle or to stop the system from collecting calls while you process your special request.

Call record editing Sometimes you need to change the captured SMDrs (station message detail recordings) because of moves or changes that were not entered during the collection cycle. When this feature is available, it should be restricted to those who need it.

Capacity Capacity is measured in two ways: number of lines and number of call records. You'll need to make sure the system you buy is big enough to handle future growth.

N.C.78	Large Business Series	On-Site Call Accounting System	Scoot	TRU System
Account code editing	•	•	•	0
Ad hoc reports	•	•	•	•
Call record editing	•	•	0	0
Capacity (lines/records)	6,000/ 500,000	3,500/ 500,000	1,000/ 400,000	6,000/ 500,000
Customized reports	•	•	•	0
Directory service	•	Optional	0	•
Resasignment during bitting period	•	•	•	•
Trial reports	•	•	•	•
Pricing schedules supported				
V&H	•	•	•	•
Message units	•	•	•	•
Flat rate	•	•	•	•
Remote PBX polling	Optional	•	0	•
Security				
Passwords provided	•	•	•	•
Pasaword encryption	0	•	0	•
Multiple PBX formats	•	•	•	•
Unattended schedule processing	•	•	•	•

Customized reports In addition to a healthy set of standard reports, the call accounting package you choose should allow you to design and print your own specialized reports. This may be nothing more than a report that only covers a certain department or division, or it could be specialized tillies. Once defined, these reports should be able to be included in the standard batch or reports that are run ev-

ery month.

—Indicates Editor's Choice ●—Yes ○—No

Directory service Since all of the telephone information is already in the call accounting system, you should be able to create a telephone directory with the right programming. This ability is sometimes treated as an option to the basic call accounting software. Sometimes it is a feature that draws information from the organizational database used to sort reports; other times it is a standalone package that simply produces in-house phone books. For maximum flexibility, this information should be available for chancing at any time.

Reassignments and trial reports It should be relatively simple to reassign people to different telephone numbers or organizations, even during a billing period. Some systems will let you produce "trial reports" that you can scan for gross errors. The system should let you

make changes to correct any gross errors you may notice.

you may more:

solved by more and the solved by the solved

or flat rate.

Remote PBX polling Companies with more than one PBX need the ability to "reach out and tooch" their other PBXs. If this is what you need, you should make sure that software is available that will automatically "poll" the other PBXs and download their call records for processing at a central location.

ing as a central rocasion.

Security The primary security need in call accounting systems is preventing someone from deleting expensive or in criminating calls from the records in an effort to hide the identity of the person making them.

Multiple PBX formats A few software packages support only one or two SMDR formats, but most will let you define the SMDR format used by your PBX. However, if you have more than one PBX, you must be sure to choose a package that supports all the formats used by your PBXs. This is most commonly done by translating the actual SMDR records into a common-format call record. Once they are converted you can process the call records from any number of different PBXs. This approach also gives you greater flexibility if you plan to acquire a new PBX in the future Unattended scheduled processing Call

records are normally collected a week or a month at a time. Ideally, the system can automatically terminate a collection and start processing the records at a preprogrammed time.—Frank J. Derfler, Jr., and Greg Campbell Another tradicional approach, leasing mainfrance obleware to one be, bl. typical-by appeals to large companies that already layer mainfrance systems and the people to run them. They pay a licensing fee to use call accounting software that runs on the mainfrance. In this system, call records (including those from remote sites) are collected and processed locally, in addition to exclude a service barrow, taken the service barrow, taken these of a service barrow, they proach has the benefit of offering a higher level of security for corporate data.

ieves or security rec corporae tasa. While using mainframe-based call accounting or a service bureau is appropriate for some cognizations, the power of to-day's PC-based software makes is difficult to beat for cost-effectiveness and flexibility. Nearly every company can assign a PC use as a background call recording the counting report generator. If PCs are a part of your organization, they can save you money in telephone management.

These systems can be used to monitor employees: telephone activity and cut down on abuse. But they seem to be most valuable as management tools, since many companies have found that monitoring often hurts morale and can become time-consuming and costly in its own right. Nevertheless, just the presence of these systems can result in decreased phone bills.

NOT JUST FOR SNOOPING Companies most often use these systems for facilitating departmental billing, boosting sales productivity, and performing network analysis.

Since PBXs are frequently connected to a variety of standard telephone lines, as well as Wide-Area Telecommunications Service (WATS) lines, privately leased tie lines, and a host of alternative long-distance carriers such as U.S. Sprint and MCI, call accounting software can help you evaluate the relative costs of these services.

These systems are also helpful to hotels and motels, consultants, and lawyers who want to track calls and costs to be billed to clients. Some programs can even communicate directly with the offices' time-and-billing systems. The reports they generate can also be used to monitor such things as

the time that sales and service reps must wait for an outside line or the time that customers spend waiting for a response to their calls. Managers can then use the data

to make their departments more efficieni. Sales-oriented businesses like stock brokerage houses and car dealerships can determine more-effective sales approaches from the call records of their PBXs by correlating the length and number of calls made by each salesperson with that person's sales figures.

WHAT ARE THEN? Call accounting packages are little more than specialized database applications. Since the derequision of lelephone services, the unpleasant but necessary task of maintaining serial numbers, recurring and nonrecurring costs, and maintenance and repair records has fallen on the customer. To help with those tasks, call accounting packages sometimes also include, or offer as an option, investory-management software. Some invokation between the control of the control of

Almost all but the smallest PBX telehone switches have a serial (RS-232C) port. The PBX uses this port to send out a specially formatted message every time a call is completed or other specific actions occur. This output is usually called the station message detail recording (SMDR), but some vendors prefer to use their own terminology.

The transfer of the SMDR records is the first task in call accounting, followed by processing the records and assessing the tracts and administration. Before widespread use of the Class well as reporting and administration. Before widespread use of the PBN's serial port to record he information on each call. The mountain of printout that would accumulate the information on each call. The mountain of printout that would accumulate the information on each call. The mountain of printout that would accumulate the information on each call. The mountain of printout that would accumulate the information of the printout that would accumulate the information of the printout that would be information to the printout that would be information th

THE MODERN WAY More-modern systems route the serial output to a device called a call recorder. This non-user-programmable data storage device holds the output until it is dumped to a computer for

■ CALL ACCOUNTING SYSTEMS

processing. Rather than producing a printed list of phone calls, call recorders allow you to use a PC to trap the SMDR records to a file on the hard disk. The PC can thus be the ideal companion tool to a PBX, enabling you not only to store the phone records but to manage and interpret the data as well.

Few PBXs have a built-in storage capability. Since recording calls is a relatively low-speed task, most installations do it on a PC as a background task. The PC records calls as it performs other functions like word processing. One product we tested. Infortext's On-Site Accounting System, even includes a processor card that fits into an expansion slot and prevents the PC's

processor from becoming overloaded. When a company has several PBXs located in different buildings or even different cities, its system uses remote polling; a central PC connects to the call recorder at the remote sites and downloads the call records. The best systems make the connection automatically during hours when it costs less to transfer the information. In such cases a "smart" modem-capable of adjusting the transmission characteristics or even of hanging up and trying again in the case of a poor connection-comes in handy.

NEXT, CALL PROCESSING Once the call records are recorded, they must be processed. This task generally takes place monthly or on a schedule determined by the billing period of the telephone carriers.

Since PBXs have different formats for. their SMDR outputs, some call accounting packages preprocess the records into a common format from which they produce reports; this feature is desirable when you have more than one brand of PBX or you are considering purchasing another PBX. Most call accounting systems require you to identify the type of PBX and the SMDR format in use at your location.

When the call records are in the format that your particular call accounting package requires, the software can then "cost" the calls, using either V&H (vertical and horizontal grid coordinates, a geographical system developed by AT&T) code tables, or some form of cost approximation. Although approximation schemes can vary widely in efficiency, call accounting soft- to help telecommunications managers in-

ware can help you rate every call so that your totals will conform exactly to the phone bills.

In addition to the way they accommodate different PBX record formats and approximate call costs, cost-accounting packages vary in how they deal with such factors as international calls, three-way and conference calls, calls over private networks and tie lines, and accounting codes used to distinguish incoming versus outgoing phone calls. The features de-

At a minimum, you can expect a report detailing the calls made from each extension, including the time, length, cost, and cost per minute.

scriptions that accompany the checklist (see the sidebar "When You Call for Call Accounting . . . ") can help you evaluate the importance of each feature to your company. How flexibly and efficiently the software handles reporting and administration tasks is also an important consideration when selecting a package.

Most call accounting packages come with a standard repertoire of call accounting reports. At a minimum, you can expect a report that details the calls made from each extension, including the time, length, cost, cost per minute, average length, and so forth. Some packages can group the phone extensions according to your departments and divisions. The best programs produce ad hoc reports on demand. For example, a program should be able to generate reports for a particular phone extension readily, even during a reporting period. You should be able to define and save these reports and include them in the usual series of reports run at the end of the month. Comprehensive call accounting reports

are essential for companies that are trying

crease their efficiency and effectiveness. Rather than devoting all month to trying to sort out the bills from the previous month, they can spend time on tasks that yield higher-paying returns, such as identifying and correcting phone abuse, finding dead or defective extensions and trunks, and reducing both the waiting time for incoming callers and user frustration.

ADMINISTRATOR'S ASSISTANT The software helps the telecommunications manager administer the phone system. The better programs allow changes to phone numbers and other organizational data during the data collection period-without creating havoc and confusion in the end-of-month reports.

While a program's ability to assign an account code to each call can be a handy feature, many offices with this capability find that their staff people are just too busy to remember to push the extra buttons. In such cases, the program should be able to add the account codes to the SMDRs after the fact.

The packages we tested represent a cross section of the PC call-accounting market in terms of cost, design, and capability. They work with various types of PBX systems, and the end user can easily install them. Other products may demand that you customize them to a particular PBX and/or installation, and many of them are available only as part of a total turnkey package installed by the vendor.

In testing the systems reviewed here. we installed each on an IBM PC AT with a 30MB hard disk and played back actual SMDR call records through the serial port of a second computer. This computer simulated the switch and was connected to the IBM PC AT with an RS-232 cable. The call records were recorded from a Mitel SX-2000 switch, a popular PBX with a rich line of features, including digital data transfer. Lloyd Hanson of Mitel helped us modify these records so that they appeared to originate in the Washington, D.C., area (a particularly tricky region since it has three area codes in close proximity, making it difficult to tell when you are calling long distance or local). We ran several reports to evaluate how well they supplied necessary information and found that the software ranges from amateurish to highly

■ CALL ACCOUNTING SYSTEMS

polished. The best programs offer features superior to those of mainframe software packages and service bureaus.

INFORTEXT SYSTEMS INC. On-Site Call Accounting System, OS-200 Standard

The On-Site Call Accounting System, from Infortext Systems of Schaumburg, Illinois, consists of call accounting software and a Front End Processor (FEP) board, a self-contained call-processing card that fits into your IBM PC-XT- or AT-compatible

computer.
We tested the OS-200 Standard system, designed for installations with up to 200 phone extensions and 55,000 call records and for general business use.

and to general obssines use:

Infortext also markets versions for professional offices and hotels and motels, as well as models for 100 to 4,000 stations and for up to 350,000 call records in one of four configurations: Standard, PSP I, PSP II, and Hotel/Motel. The Professional Services Packages (PSP I and PSP II) offer cilient-billing features used by accounting,





Inforted's On-Site Call Accounting System differs from the other products in that in addition to the call accounting software, each on-site system also includes a From End Processor board, or FEP, a self-contained call processing card that fits into an IBM PC-XT- or AT-compatible

The FEP takes the load off the host machine and allows data capture even when the host PC is turned off. An integral part of the OS package and more than just an internal buffer for SMDRs, it has a processor and memory to collect and process call records. Because the FEP has its own batteries, it can continue to collect calls even when the PC is turned off.

To install the FEP hardware, you move one jumper on the board (to turn on the batteries) and insert the board in the PC.

manage up to nine remote PBXs from one central site. Other optional software allows you to transfer call records to .DIF format for analysis with popular spreadsheet and graphics programs.

The Infortext FEP, with a processor and memory to collect and process call records, takes the load off the host machine and allows data capture even when the host PC is turned off. Since this board accesses the host PC's bus, it can write to the hard disk when the bus is available, and, because the FEP has its own batteries, it can continue to collect calls even when the PC is turned off.

The FEP is preconfigured for the host PC, so you must specify its make and model when you place your order. Infortext can also install the system and supply training, but the fees range from \$500 to \$1,400.

SOME MODIFICATIONS NEEDED Infortext's 15 local and regional area offices providing customer assistance are supplemented by a national toll-free number. You receive 90 days' free support, and you can purhase extended assistance.

The installation process can be intimidating for the nontechnical user, but once installed, the system is easy to use. There is no installation program, but the documentation specifies instructions in checklist fashion. You must also modify your CONFIG.SYS to include the appropriate

device driver for the FEP board, and if you want the system to start in the call processing mode, you must also change your AUTOEXEC.BAT file. A sample AUTOEXEC file is provided.

AUTOEXEC. BAT THE A sample AUTOEXEC file is provided. To install the FEP hardware, you first move one jumper on the board (to turn on the Pc. You respond to prompts, to set the date and time and download a program to the FEP. Once you've initialized the board and connected it to the PBX, you're ready

to run the call collection and accounting

programs.

A call recorder screen shows information about the number of calls voitien to the well as the number of calls written to the buffer or disk. The system also displays a message indicating the time the last call record was received. In normal operation, the FEP matches the call records with directory information and then costs them and stores them to the disk in a report

If you are using the PC for other applications or to produce call reports, the FEP simply stores them in its own on-board buffers. The FEP will beep every 30 seconds if the buffer exceeds 75 percent. At 98 percent capacity, it will dump the buffer contents to a temporary disk file. When the PC's processor is free and call processing resumes, the system processes calls in the temporary disk file first, before handling

The Stan



dards.





The Wyse WY-700 Graphics Subsystem. In desktop publishing, PC users have set high standards for themselves. Among displays, their first choice is our WY-700 high resolution monitor and video board. Its the best seller by a wide margin, for reasons that are plain to see. The WY-700 sharp 1280.880 pixel. resect the wideous properties of the properties of the properties of the wideous properties. The wideous properties will be a seen to be a second to be a seen and the properties of the wideous properties. The wideous properties will be a seen and the will be a seen as the will be a se

It should come as no surprise that the leader in displays is also the leader in compatbility. The WY700 now runs over 100 programs in high resolution mode. Including Xerox Ventura Publisher and Aldus PageMaker/PC, plus many other DTP applications. And if you do more than desktop publishing, the WY700 supports packages like Microsoft Windows and Excel, Lotus 1-23, and AutoCAI.

We've just bundled a Hotshot product. Now the W'x700 comes bundled with Hotshot Grab, from Symsoft. It enables you to capture and store any text or graphics acreen and transport it to another life or DTP application. For example, with a few keystrokes you can load a CAD image into your DTP document. And Hotshot Grab, a 899 value, is free with the WYy00. Now But not forever.

SystemWyse^a adds even more. Wyse is the only manufacturer who makes the monitor and video board in its DTP graphics subsystem as well as a selection of 286 and 386 based PCs to drive it. That gives you a system integrated with singular harmony. And supported by a singular source.
Find out why more PC users see deskton

publishing our way. Call for more information.

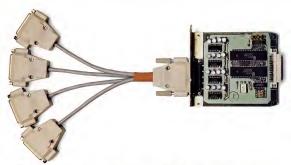
1-800-GET-WYSE

dus of Wyse Bechnology Other trademarks/owners: Venturs Publisher/Xerox; Aldi gehalee: PC/Aldus: Hosshot Grah/Symodt; Excel, Windows/Microsoft; Lotte 3/Lotus Development; Aus/CAD/Autofesk, Scoren text and graphic adapted fro Glassical Orders of Architecture, by Robert Chitham, Ruzoli International, NY.

IRCLE 734 ON READER SERVICE CAP

WYSE

We make it better, or we just don't make it.



NOW YOU CAN CONNECT FOUR USERS TO ONE LASER PRINTER.



With the Mannesmann Tally® MT910 Laser Printer and its Multiuser Interface option, you can connect four users for just \$1050 each.

Each of you will have your own I/O port, programmable for your own protocol and emulation. Laser-crisp text and graphics at 300 dpi. All the specs you see in the center. And with an optional 5-bin sorter, even your own output bin.

So call the number below for more information

- Dual output bins standard, 250 sheets each.
 Memory: 500K; 400K available to print graphics or download additional fonts.
- Manual feed handles single sheets, enve lopes, transparencies, and labels. ■ Emulations: Diablo* 630, Epson* FX, IBM* Proprinter," HP" LaserJet Plus," and Clume"
- Proprinter, "ir Langue | Proprinter, "ir Langue | Proprinter, "ir Langue | Proprinter | Proprint
 - condensed, and expanded.
 Ontions: 4 user I/O extensive library of optional fonts in cartridge or down loadable formats [] 1.5 Mg RAM upgrade 7 5-bin sorter. CIRCLE 224 ON READER SERVICE CARD

or to connect with your nearest dealer. And he'll connect you

with the only out-of-the-box laser printer on the market today that gives you so much for just \$1050 per user.

A Mannesmann Tally.

MANNESMANN TALLY 1-800-843-1347

In Washington state, call: 206-251-5524 Ext. 126

■ CALL ACCOUNTING SYSTEMS

those in the FEP buffers. This ensures that you rarely miss a call record.

The system relies heavily on the function keys for navigating the menus. Even on a color monitor, the display always uses white letters on a black screen.

PASSWORD, PLEASE Ten user-definable passwords protect each of the four critical modules; this setup seems to offer reasonable protection. However, the main menu does not require a password, nor does the system parameter menu, which

■ The on-line capability of Infortext's system makes it easy to make changes of employees, rates, and phone numbers as they occur and still create accurate reports.

shows the currently defined passwords.

You can assign individual telephone numbers, or groups of extensions, to divisions and departments and generate appropriate reports. In addition, you can group extensions by type to identify those which are normally used for administrative purposes and those to which you want to add a client surcharge. The costing scheme even

includes (scleral), state, and local sales tax. The on-line capability of Inforenzi's system makes it easy to make changes of employees, rates, and phone numbers as they occur and still create accurate reports. Like other call accounting systems, it generates an exception report of invalid account codes or codes that have been charged to the companies "overhead" ascount. But, millie most other systems, it does not be supported to the control of the operator call up these records and correct or confirm the account codes.

The system offers four basic and betterthan-average report types: analysis, summary, detail, and exception. All the reports are menu driven and prompt you for the necessary parameters. The output usaally lists the company's name and the date and time the report was produced. It clearly states the reporting period overed as well as other selection criteria used. The analysis allows both detailed and summary reporting by state, area code, prefix, or trunk, client code, authorization code, ex-

tension.

An optional reports scheduler, available for \$250, allows you to automate report production. Other optional packages are available for \$500 each.

These products are competitively priced, yet the high levels of built-in support make them a good value.

SOFT-COM INC.

Scout

Soft-Com, a telecommunications management company founded in August 1984, has been marketing call accounting packages since March 1985. Its Scour may not be the fancies of systems, but it performs the assigned tasks efficiently and is easy to use. Skilfill marketing and a good basic product have helped push sales past the 1,000-unit mark.

Compared with other call accounting systems, Scout and Scout Jr. are real bargains. Scout, Version 3.2, normally supports up to 600 lines. In an environment in which lines are being less heavily used, the program can support more lines. Soft-Com's \$1,500 Scout Jr. handles telephone systems with no more than 80 extensions,

while the \$4,500 Scout Commander handles very large systems.

NOT DOS, EXACTLY Scout runs under Concurrent DOS, not DOS. While Concurrent DOS's commands are similar to DOS (you can run most DOS software), Concurrent DOS is a multitasking operating system. You can call up different programs in four windows. You normally see the main Scour program running in one window, while the Call Detail Recording (CDR) resides in a second window. This

leaves two windows for other applications. This window structure is handly, but its departure from standard DOS pooses several problems. We tested the system on Concurrent DOS 5.2, but some of Scout's programs were apparently written under Versions 5.0 and 5.1 and refused to nut under the newest version. Concurrent DOS 6.0 (shipped in January, too has to be under the new terms of the structure of the programs were appeared to the programs of the property of the programs where the problems of the programs of the program of the programs of the program of the program of the programs of the programs of the program of the program of the programs of the programs of the program o

times proteins.

Concurrent DOS before your

minutall Soura. Soon but no installation your

pergarm that copies each of the eight floppy

man that copies each of the eight floppy

disk onto your hard disk. At a registration

screen you enter your company name and

been muther. You enter this information

key number that good only for your par
ticular serial munther and company name.

During installation you can select a spe
cially peckage like client billing, hosted

and you should the general the storage of

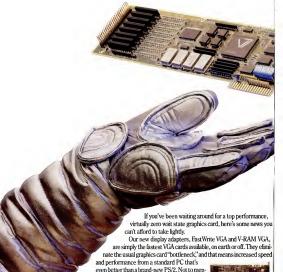
performance of the perform



One dissinguishing feature of Soft-Com's Scoat is that it runs under Concurrent DOS instead of PC- or MS-DOS. Since Concurrent DOS is a true multitasking system, Soft-Com recommends having at least 40K RAM.

Before installing the Scoat system, you must install Concurrent DOS by running the installation program from your floopy disk drive. Also, you should connect the PC to the PBX with an RS-232 cable. The SelPort utility makes it easy to modify band rate, word size, stop bits, and handshaking protocols.





tion resolution above and beyond standard VGA—all the way up to 1024 x 768.

The following are registered and unregistered trademarks of the companies listed: FastWinte VGA, V-RAM VGA, Video Seven Inc.; PS-2,

V-RAM VGA \$799



You don't have to wait for complete compatibility, either. Not only are both FastWrite VGA and V-RAM



VGA cards that are form-factor compatible. They have the same daughter card connectors as the IBM PS/2 Display Adapter to accommodate hardware add-ons in the future.

There's more. Once you buy a Video Seven Display Adapter, we won't leave you hanging. You get free technical support, guaranteed VGA compatibility and a full five year warranty. All for a very down-to-earth price.

So don't wait another nanosecond. Visit your favorite dealer and find out more about FastWrite VGA and V-RAM VGA. Then get a grip. Because once you see what they can do, you're going to be walking on air.

SetPort utility to modify baud rate, word size, stop bits, and handshaking protocols.

You verify that SMDR call records are being received by running PC-Talk4 and actually watching the call records roll across the screen, then use SETUP to save the appropriate serial port configuration for all future uses—a neat feature.

OPTIONS OFFERED You type SCOUT to begin operation. The CDR task appears in the second window, and you can then access the main Scout menu. You can perform all the system functions with simple, logical, number-driven menus.

An outgoing a cline the rate steps call length and out per minute of local-phone-costing schemes, which are assigned to the prefixes in each of the five local area codes. Soft-Com offers a Local Rate Table Option, 3175 for Court and S100 for Scour Jr., with files that are customized specifically for your area code (especially handy where the local calling area spans several area code).

If you purchased the Local Rate Table Option, your Scour system is ready to operate. If you didn't, you must first identify local area codes (up to four, in addition to your home area code) and prefixes to the system.

You can assign time-of-day discounts to the call costing tables. While the ratestep approach accommodates nearly all lo-

cal-call-pricing strategies, it does not support certain types of bulk-rated services.

Scout rates long-distance calls through true V&H grid strategies. You can even specify your common carrier, allowing the system to use the V&H tables in the same way that your carrier does when preparing your bill.

The general business package offers a suite of reports, with detail reports by department, extension, or trunk, as well as summary reports of frequently called numbers, departmental totals, or trunk usage. These reports are adequate for most business needs.

If you're looking for specific calls (such as people calling 900-area-code numbers), you can run the Search Report, which allows you to select calls by date, duration, cost, department, extension, phone number, and client code, and by outgoing, incoming, or local calls. You can sort this report by extension, trunk, or dialed number. The Search Report also allows you to generate exception reports for particularly long or costly calls.

Another Scout option package is Computer Readable Output (CRO), which lest you transfer processed call data to a file or to the COM2 port. It also lets you redirect your call records to other applications for further processing or archiving.

A relatively primitive directory allows you to define departments with a numeric code of up to eight digits, as well as extensions. The directory does not support hierarchical organizations, although you will find one in Scout Commander.

With client billing, users must enter the appropriate account or authorization codes when placing calls. The client database supports codes of up to 12 digits (most PBKs use 3- or 4-digit codes). Summary and detail reports are available for client billing. As with most systems, you may meet to go back to the call records and add the appropriate authorization codes after the calls are recorded.

HANDLING HOSPITALITY Scout's Hospitality System lets you print a guest/patient's phone bill on demand. You can also define and apply both flat-rate and percentage surcharges to all guest calls, while billing administrative and staff phone calls at the standard rates.

Scout Commander was not available in time for our tests, but its several add-on modules were to nun either alone or integrated with Scout Commander's database files. The directory allows multiple levels of departments and divisions, and it permits you to define Trunk Groups to simplifivent mercia.

fy your reports. For \$14,000 to \$16,000, you can get an integrated telecommunications management system that includes Scout Commander's Directory, which allows you to perform directory searches on any of 17 fields and even custom design the screen format. The directory system supports multiple users, and if installed on a Compaq Deskpro 386, it lets you connect upwards of ten dumb terminals to support directory inquiries. Scout Commander's Inventory lets you manage the cables in your telephone system as well as track work orders for prompt delivery of services. The Repair Tracking System minimizes time lost because of faulty equip-

BOTTOM LINE If your problem is telephone abuse or you simply need economical telephone management, Scous should pay for itself in a matter of months. While Concurrent DOS may take some getting used to, the Scout programs are easy to use and well built, good for small to mediumsize companies.

TRU System

Telco Research Corp. has been selling telephone management software and hardware products for more than 12 years. At the heart of its TRU System call accounting product is the Telco On-Site Cost Allocation system, or TOSCA, the software component that actually prices calls made from a variety of PBXs.

Basic TOSCA I is for systems with only one PBX, no more than 1,000 lines, and 35,000 calls per billing period. Basic TOSCA II is for systems of up to 6,000 lines and 500,000 calls. For multiple-PBX environments or advanced call-pricing features, there's Extended TOS-CA—which includes user-modifiable call-costing techniques, message-unit costing, combined equipment, and service billing.





Scout, Version 3.2 Soft-Com Inc. 22 W. 21st St. New York, NY 10010 (212) 242-9595 List Price: \$3,000 Requires: 640K RAM: IBM PC-KT, PC AT, or

BM PC-XT, PC-AT, or compatible or AT&T 6300 or fully compatible; RS-232C serial port; 5½-inch 360K floppy disk drive; 10MB hard disk drive; Concurrent DOS. In Short: A good low-cost package that can

In Short: A good low-cost package that can run up to four programs simultaneously, including CDR (Call Detail Recording). Offers General Business, Client Billing, or Hospitality software. Not copy protected. CINCLE 648 ON PRADER SERVOL CARD.



When you got your PC, it was love at first sight. How did it ever come to this? It's taken over your streen has disappeared beneath a thick layer of dust. The noise from your printer is driving you crazy. You just can't go on like this...

Kensington CONVENIENCE

Don't do onything rash.
Kensington con put you ond
your PC bock on good terms.

1. Our Universal System Stand gets your CPU off your desk and out of your way. Adjusts to fit ony PC up to 6½" wide. \$29.95

Our anti-static **Dust** Cavers protect your computer, monitor, and keyboord from dirt and dust. \$19.95

3. Our Printer Muffler 80 ond Printer Muffler 132 (for 80 ond 132 column dotmotrix printers) reduce printer noise by 75 to 85%! Only \$69.95 and \$89.95

4. Our Printer Muffler Stand roises your printer and Muffler 4" for hondy poper storage. \$29.95

5. Our Universal Copy
Stand puts your notes next to
your screen, directly in your
line of vision. Attoches to either
side of ony monitor. \$29.95

6. And our **Keyboard Slideaway** gives you the extro room you need for your keyboord. Slides under your PC when not in use. \$49.95

For o free brochure on our full line of PC occessories, coll 800-535-4242, 212-475-5200, or write Kensington, 251 Pork Ave. South, NY, NY 10010.



■ CALL ACCOUNTING SYSTEMS



Since Telev's TRU System user your PC as a full-time call recorder, you'll probably want to order the optional TRU Solid State Recorder to protect you from some of the hazards of relying on a PC to operate continuously. This box, which is neither a PC nor a user-programmable device, attaches to your PRX and captures call records to battery-backed RAM. When a TRU System polls the recorder, the devict discorres the contents of its buffer while never missing a call record.

The unit we tested came installed in a standard IBM PC AT with 512K RAM. The PC was also fitted with a four-port serial board and bracket. Using standard 25-pin RS-232C connections, you can connect the PC directly to your PBX or to a modem (for remote manipulation of other call recorders or TRU System programs).

RECORDING AND COSTING
Another component of TRU System is the recording software, written to operate continuously in the background as you run other programs. In our tests the TRU System background call-recording program used only
TRU System and run programs as well as back fills from it. However, to
System and the continuous and the continuous continuous for the challenge capacity of up to
50,000 calls per hour, you'd need a fast critical.

TOSCA uses full V&H costing for accurate results. The vendor updates V&H tables as necessary, and users can supply missing locations and corrections through the V&H Overflow table-a feature lacking in many other systems. The top-of-theline system, Extended TOSCA, also features message-unit costing. The messageunit approach to billing, used in some large cities, is based on the number of calls to certain area codes and prefixes. Since message-unit rates normally depend on the volume of calls placed over a certain period, pricing these calls individually is difficult. Extended TOSCA also features userchangeable call-costing techniques and time-of-day discounts.

Since the TRU System recording program uses your PC as a full-time call recorder and since PBXs are full-time devices, the PC is normally left on continuously. To overcome some of the hazards of continuous operation, you can

order the optional TRU Solid State Recorder, which attaches to your PBX and captures call records to battery-backed RAM. The capacities of these call recorders range from 1,500 calls to 48,000 calls. When TRU System polls the recorder, the device disgorges the contents of its buffers while never missing a call record.

Customers who don't own a PBX but use Centres services from their local phone company can purchase a Centrex Adapter. Similar to a call recorder, this device connects to any of the large AT&T central Telephone Office switches generally used for Centrex systems. The Centrex Adapter is polled through the telephone lines to retrieve Centrex call records for processing by TRU System.

UNIQUE FORMATS TRUE System typically receives SMDRs from the PSV and format truspe to the switch. But the program uses them in something called the Telco Standard Format (TSF). It's up to you to convert the SMDRs from the PBX format to the TSF with Telco Research Topical truspenses, Using a standard format allows you to mix call records from different up types of PSV. William this confidential types of PSV. William this conjugate the programming language. Using a standard format allow you PSV. William this conjugate the programming the

Call records are stored in compressed binary form. This saves space on your hard disk and takes less time to transfer via mo-

dem when gathering them from remote TRU System programs. A program called INQ lets you view, select, and search the compressed records. You can also use the INQ monitor function to observe call re-

cords as they are collected.

You can run TRU System reports on the current collection of call records in the TRU.DAT file or in the cumulative billing

file, CB.DAT

One of the older call accounting systems on the market, Telco's TRU System has a track record of handling large and widely distributed telephone networks successfully. Each TRU System recording software installation or Solid State Recorder can record call records from as many as 15 PBXs. You can poll as many as seven of these systems by using the optional Call Polling software package.

The unit we tested came installed in a standard IBM PC AT with 512K RAM and was fitted with a four-port serial board and bracket. Using standard 25-pin RS-232C connections, you can connect the PC directly to your PBX—or to a modern for remote manipulation of other call recorders or TRU Systems.

While this system has an attractive set of colored shadow-box menus and windows, the actual operation and flow among software modules is somewhat





\$4,900: TOSCA II: \$9,800, Extended TOSCA: \$12,500; recording software alone: \$6,000.

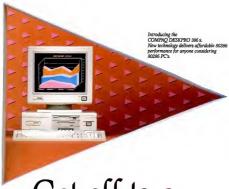
\$6,000.

Requires: Dependent on system configuration
In Short: Can support one or more PBXs, in-

cluding remote PBXs. Lets you mix call records from different types of PBXs. Storescall records in compressed binary form to save disk space and reduce transfer time when guartening this trans return of TRU System programs. Copy protected.

Accelerate.





Get off to a fast start.

Now, breakthrough technology from Compaq brings the power and potential of 80386-based personal computing to millions of business PC users.

Introducing the COMPAQ DESKPRO 386s. It's the first personal computer powered by the revolutionary new Intel* 3865X* microprocessor. It's also the first designed specifically as an affordable, high-performance alternative to 80286-based PC's.

The COMPAQ DESKPRO 386s will run the software you have today—such as MS-DOS* and Microsoft* Operating System2 from Compaq—up to 60% faster than most 10-MHz 80286 PC's. It will also run the 32-bit software that 80286 PC's won't run at all. Microsoft Windows/386, for example.

You can tailor the COMPAQ DESKPRO 386s to your exact needs. Choose high-performance storage options such as 2D, 4D, or 110-Megabyte Fixed Disk Drives. Tape backup options. Even diskette drives in 51/4-inch and 31/4-inch sizes.

VGA graphics are built in. So is one megabyte of highspeed memory, expandable to 13 megabytes without using a single expansion slot. You can also add a mouse,

printers and more without using additional slots.

All these features and more are packed into a sleek

new design that fits places the competition can't. So get into the PC passing lane, and head for all the 80386 power and performance you really want, with the revolutionary new COMPAQ DESKPRO 386s.



Never look back.

Once again, Compaq introduces a PC that leaves every other in the dust. With its new Intel 25 MHz 386* microprocessor and exclusive 32-bit COMPAQ Flexible Advanced Systems Architecture, the new COMPAQ DESKPRO 386/25 runs up to 60% faster than most 20-MHz 80386 PCs.

FLEX Architecture uses separate memory and peripheral buses operating in concert to maximize system performance, while maintaining competibility with industry-standard hardware and software. The 25-MHz cache memory controller keeps data instantly accessible, so the processor works at 0 wait states 95% of the time.

With the addition of a 25-MHz Intel 387° or WeitekTM coprocessor, you can match the numeric processing of a dedicated workstation, at a fraction of the cost.

You can go from one standard megabyte of high-speed RAM to 16 megabytes. And, for storage-hungry applications such as most networks and multiuser systems, you can get up to a massive 1.2 gigabytes of storage? Internal tape backup options are also available.

For CAD/CAE, as a file server and for multiuser systems, the new COMPAQ DESKPRO 386/25 is the ultimate solution. And, for intense PC users who don't have a millisecond to spare, nothing less will do!

COMPAG

It simply works better.

Now there's room for everyone on the fast track.



When Compaq pioneered highperformance personal computing and introduced the industry's first 80386based PC's, we gave performance-hungry business users, engineers, analysts and software developers the tools they needed to perform intense applications faster and better.

Now, with the new COMPNQ DESKPRO 3868 and COMPAQ DESKPRO 386/25, we're not just pushing 80386 technology forward; we're widening it. So that PC users at every level can take advantage of the industry's highest performance—Compaq 80386 performance.

The new COMPAQ DESKPRO 386s lets anyone considering 80286 PC's head straight for 80386 peroriginal COMPAQ
DESKPRO 386 and
COMPAQ DESKPRO 386/20
deliver even higher performance for more demanding applications.
And now, at the top of our
line is the new COMPAQ
DESKPRO 386/25. The
most powerful personal

computer available.

Together, they create
the highest-performing PC
line available. In each one,
our exclusive design lets
every component run at
optimum speed. This provides a substantial performance edge, while
maintaining compatibility
and connectivity with your
current hardware and
software.

Now, you'll run your current MS-DOS* applicacurrent MS-DOS* applications at top speed. Plus new 80386 software, such as Microsoft Windows/386. With MS* OS/2, UNIX* or XENIX*, you'll simultaneously run multiple programs, switching between them instantly. And, with a COMPAQ 80386 PC, you'll

do it all feater.

Now, with legendary
Compaq performance and
quality available to eeryone, the fast track is wider
than ever. Soocelerate. Call
1-800-231-0900. Operator
64. In Canada, call 1-800-235-8688. Operator 64.
We'll give you the location
of your nearest Authorized
COMPAQ Computer Dealer
and a free brochure for any
COMPAQ 60386-based 0.000 per computer
COMPAQ 60386-based 0.000 per computer
COMPAQ 60386-based 0.000 per computer College
COMPAQ 60386-based 0.000 per college
COMPAQ 60386-bas

COMPAQ* and COMPAQ DESETED 366* are trademarks of Compaq Companies of Memorist's ASCODE 25 EXECUT and MS* are and MS* with the control of the Companies of Companies of Memorist of Memorist and MS* Windows 2186 are produced in the Companies. Produced assists mentioned herein may be trademarks assiste registered U.S. Fattent and Trademarks assiste registered U.S. Fattent and Trademarks Office. COMPAG 25 EXECUTED 3505 Experies 218. The companies of Companies Compan

computer.

non. All rights reserved.

"Hereafter referred to as 803865X, 80386 and 80387 respectively.

1Using two optional COMPAQ 300-0600-Megabyte Fixed Disk Drive Expansion Units.

<u>COMPAQ</u>

It simply works bette

slow and clunky. The program modules are tied together with MS-DOS bash files, which reveal their presence with a not-so-subtle "Echo Off" message. The MENUS directory alone has 30 batch files. While these thoroughly bulletproof procedure files religiously check for error codes, they give TRU System as unpolished look. The system does not normally support the Ess key and uses P6 to exit the modules.

PROCESSING BY THE CLOCK You must be at the main menu for the system to execute scheduled processing, and the system automatically logs you out after roughly 10 minutes of no keyboard activity so that you won't accidentally miss a scheduled event in another screen.

If you do miss a scheduled event, the next time the system comes to the main

 TRU System is a reliable and widely used workhorse in the call accounting arena.

menu and realizes it missed the start time, it immediately begins to execute that task. If the job is one of those IO-hour processing projects, you'd better send out for some food and drink. Although you can safely interrupt the scheduled job when it returns to the main menu between tasks, you may still have to wait hours.

Each moming you receive a summary report of the nightly scheduled processing done, as well as a count of the number of records processed—useful in diagnosing cases in which your switch and/or call recorder is withholding SMDRs.

Password protection provides a modicum of security. Each valid password can permit access to different functions; without a password, you are able to do little more than monitor background call-recording. But because this software is strictyl MS-DOS-based and as skilled PC hacker could wreak have; it's a good idea to delicate a PC to the system and run it in a

locked room—away from hackers' hands. TRU System supports a Racal-Vadic 1200PA modem, which allows the Teleo technical support staff to manipulate your system remotely.

The system we tested lets you define four organizational levels and assign easyto-remember four-letter codes for each di-

Telco Research offers an optional Client Billing package for professional offices. A similar product is Felco's Hospitality package for hotels and motels, which allows you to record and report on all phone calls in real time (unlike the batch processing mode otherwise used), and it

can print bills on demand. Teloo Research offers good technical support, flexible training options, and a support, flexible training options, for PCs, to both of sophisticated products for PCs, to both of the print of the print of the data. And Teloo circuit monitoring can help you detect inoperative trunks—in real time. It's a reliable and widely used workhores in the call accounting areas. (Teloo Research publishes a pamphel you might want to real. "46 Warsough the Use of the TRU System."

XIOX CORP. Large Business Series

Panic That was our reaction when we found only two floopy disks in the carton containing Xiox Corp. § \$8,400 Large Business Series software. The people out in Burlingame, California, know a thing or two about writing tight code, but do they know how to write a good call accounting system? The answer is yet if you're primarily interested in call management, marbet if you primarily want call costing.

The Large Business Series is written in compiled BASIC, Version 2.0, and concentrates more on functions than on screen complexities. It does not use V&H tables for costing calls. Instead, costing is based no series of nelse and rates that only approximate the actual tariffs. Storing a handilor of nulse and some numbers to handilor of nulse and some numbers to maintain large V&H files, which on other systems can acceed IMB. The trade-off's call costing accurate

HELP ON F9 You simply create a VIOX directory on your C: drive and copy the files to it. With no modifications required in CONFIG.SYS or AUTOEX. ELBAT, you boot the software by typing SETUP. Then the easy-to-use menus take over. You can start be Large Business Series from a subprogram or a batch file, or by directly entering the main merine the pull of the control of the control of the pull of the control of the control of the pull of the pull of the pull of the pull of pull

by directly entering the main menu.

At first the menus seem inconsistent, but with further investigation the approach becomes clear. The main menu uses the function keys for making selections, and serving PI always shows you the main serving PI always shows you the main serving PI always shows you the main testing PI always shows the main testing pI always show and the main testing pI always show the pinch of the pinch shows the pinch always show the pinch show the pinch always the pinch show th

Call records are stored in a compressed binary format, but the program lacks password protection. This is a cause for some concern since you can use the reorganization module not only to reorganize calls and charge them to different customers, but also to delete call records entirely.

Usually the Large Business Series runs on a PC connected to a Xiox Call Storage Buffer. This battery-backed device, which fits between the PC's serial port and the PBX, holds from 1,500 to 8,000 call records. The number of records it holds de-





Xiox Corp. 577 Airport Blvd., #700 Burlingame, CA 94010 (415) 375-8188, ext. 225 List Price: \$6,400 without account codes.

Requires: 256K RAM; IBM PC-XT, PC
AT, Compaq, or other 100 percent compatible; serial port, parallel port, and printer;
10MB hard disk drive, one floopy disk drive;
DOS 2.1 or later.

In Short: A fast system that tacks V&H costing but can collect from remote systems. Supports authorists directory's hanges, and repricing, features organizational directory sorts and syear's support included in the price. Not copy protected.

PROCESSES OF MERCHANDER AND EXPLORED.



Usually the Large Business Series software runs on a PC connected to a Kinc Call Storage Buffer. This battery-backed device, which fits between the PC's serial port and the PBX, holds from 1,500 to 8,000 call records, depending on the size of the buffer, the type of PBX, the number of calls, and the use of account codes. When you run the software, it retrieves the call records from the call recorder and processes them.

While the Large Business Series raws on any IBM PC-XT, PC-XT, or MS-DOS-based compatible, Xian recommends certain configurations based on your call volume. It recommends an IBM PC-XT or equivalent to handle up to 100,000 calls per billing period. For more calls, you'll probably want a Compaq Deskpro-386 with a high-speed printer. An XT supports up to 90,000 calls per month, System requirements include DOS-3, I or lates and at teast 256 RAM.

pends on the size of the buffer, the type of PBX, the number of calls, and the use of account codes. When you run the software, it retrieves the call records from the call recorder and processes them.

CONSIDER YOUR CALL VOLUME The software itself is available in versions with capacities from 100 to 6,000 extensions. Each is available with either Feature Package A, which does not support account or authorization codes, or Feature Package B, which does support them; prices range from \$1,900 to \$16,000.

Most recommends certain configurations based on your call volume—an IBM PC AT or equivalent if you have up to 10,000 calls per billing period. If you have more than that, you ill probably want a compaq Deskop 366 with a high-speed printer. For low-volume users, an XT supports up to 50,000 calls per month. The only requirement for the system is DOS 2.1 or later and taleast 256K Rat Least 256K RAT

The Large Business Series has strong telephone-network-management capabilities. You can display and arrange call data nearly of special policy and proper call data nearly of special checks, like tooking for 900-number calls, or produce monthly reports to show trends. The cost reports are inherently not as accurate as those produced by a system using V&H tables, but if the calling patterns of your organization

stay steady, you can adjust the tables to bring the results into line.

There are over 100 standard summary

and detail report formats, and you can easity write your own report formats. Although you can call up all reports for a specific date range, you can also use the preselect feature to select calls based on call type, exceptional cost or length, organization codes, area codes, access codes, or trunk codes. The Large Business Series will keep your selections in effect until you cancel them.

The system's organizational sort capability is a powerful feature, particularly valuable when printing reports of up to 500,000 records. The software assignments to organizational levels, and a separate utility handles midmonth reorganizations. Report generation involves less overhead, since the system stores organization codes with the call records. Organizations are assigned numbers, but their names appear printed on the reports.

ON-LINE LOOKUPS Printed reports, both standard and custom, are available for execution on a specific schedule. Because the system usually processes calls from the call buffer, the software is not structured to

collect calls while it processes reports.

The Large Business Series also supports real-time on-line lookups of call records, a facility which lets you find out

how your phone system is doing before it's too late to remedy the problem.

The software can handle large distributed systems. An optional remote-polling module collects information from multiple remote sites. If the sites are running the Large Business Series software, you can collect the already-processed call records. By using a single structured directory, you can include the calls gathered from remote sites into the local call files. If you choose not to mix the call records, you can easily specify separate files and even libraries (subdirectories) of files for the reports. A special Data Collection Module is available at reduced cost. It's essentially the Large Business Series software without the reports module.

The Large Business Series supports Xiox Remote Access (actually Meridian Technology's Carbon Copy remote operation software), which is available at no rata charge with the series. With the Small Business Series or Retail and Billback systems, this package costs an additional \$195. With Xiox Remote Access installed, Xiox's technical support staff can

 If you need strong organizational directory sorts, fast performance, and easy-to-use screens,

and easy-to-use screens, the Large Business Series could be for you.

remotely manipulate your PC. Standard software support from Xiox includes service for I year.

We did not test the Client and Billback Series, which is offered in five models, for from 100 to 2,000 extensions. It is also part of Feature Packages A and B as well as in a Basic package. Prices range from 875 105 9,875. While these packages will not support as many extensions as the Large Business Series, you can use them in a distributed fashion to support even the largest customers.

COMPLETE WITH 64MB 386 TOWER HARD DRIVE!

ZEOS 386 TOWER. NEW, FAST AND POWERFUL. THE INDUSTRY'S MOST UNBELIEVABLE VALUE.

BELIEVE IT. STANDARD FEATURES INCLUDE:

- Genuine 32-bit Intel 80386, 6/16 MHz Keyboard selectable. Zero-Wait CACHE using 64K of SRAM.
- 1 MB of 32-bit RAM on board. System expandable to I6MR.
- 64 MB Miniscribe Hard Drive coupled with Adaptec's 2372 ultra high speed controller; 1:1 interleave, 800 KB/sec transfer rate!
- 1.2 MB High Capacity Floopy Drive. ■ Disk Caching Software for further
- enhancement of disk performance. ■ Deluxe heavy-duty tower case with six
- half-high drive openings. ■ High-Res 12" Non-glare Amber Display, Tilt & Swivel base, Hercules compatible Adapter supporting up to 132 columns.
- 101 Key Enhanced Keyboard, Pleasant
- "Tactile/Click" Feel. Clock/Calendar with Battery Backup.
- Serial and Parallel/Printer Ports. ■ 6-16 and 2-8 bit AT-compatible 1/O slots. 287/387 Math Coprocessors
- optional. ■ Fully compatable with virtually all XT/AT and '386 software.



Our complete 386 Tower. With a 64 MB hard drive, 1 Megabyte of ZERO wait memory expandable to 16 Megabytes. Monitor, keyboard, drives and controllers, all of the highest qualityeverything and more for only \$2.995. How can it be?

Because it's ZEOS, that's how. Your ZEOS 386 Tower comes to you factory direct, fully assembled, burned-in and tested in our own laboratories. Every system is built to order. Custom built actually, right to your own specifications. And talk about performance, compare these test results using PC Labs Benchmark Series Release 4:

2EOS 384/36 Treese 2EOS 386/20 Tower M PS/2 Model 80-07

ONLY pare quality and compare value you'll find your ZEOS 386 Tower is the

Benchmark! We have many other drives and options too. They include: EGA color upgrade with auto switch controller, Fully tested, Add only \$495. 20 MHz upgrade. Add \$500.

 High capacity drives, tape back-ups and many more options. For details call 800-423-5891.

Order now with confidence. Your ZEOS 386 Tower comes with a Full One Year Limited Warranty and our 30 day Full Refund Satisfaction Guarantee. Call now, 800-423-5891. CIRCLE 721 ON READER SERVICE CARD

ORDER NOW TOLL FREE 800-423-5891



When you compare speed, com-



 Easy Installation Require No Extra Expansion

Works With All IBM PS/2 Models

Comes With Its Own Floppy Controller Adaptor Unique Dual LED Indicators For Read/Write Signal

Shipping: Add \$10.00 per drive (UPS Ground) Add \$15.00 per drive (Federal Express Standard Air) CA Resident Please Add 6.5% Sales Tax.

Dealer Inquiry Welcome! Full Line of 31/2" & 51/4" Disk Drives. OPTIONAL 31/4" / 51/4" DISK DRIVE

SWITCH ADAPTOR IS AVAILABLE FOR THOSE PS/2 HAS TWO 31/2" DISK DRIVES INSTALLED. THE PRICE FOR THIS ADAPTOR IS \$40.00

Order Now! 1-800-433-6224

1-800-553-6224





SEND MONEY ORDER OR CHECK TO: KINSON PRODUCTS CORP. 482-484 SUNRISE HIGHWAY

ROCKVILLE CENTRE, NY 11570 For Inquiry please call (516) 763-0906

M.P.S. 2 is the registered trademark of International Business Machines Corp. rms: 15% restocking fee on non-defective goods. No return w/o RMA*, No refund on shipping.

■ CALL ACCOUNTING



On-Site Call Accounting System, OS-200 Standard

The Infortext On-Site Call Accounting System offers performance and quality for any type of office. It accurately costs calls using any of several costing techniques, including up to three separate V&H tables. It can unload the call collection function from the host PC without diminishing performance and can collect call records reliably even when the PC is turned off. But the best feature of all is the company's track record and system of user support. Infortext obviously listens to its custom ers' suggestions and has refined the product to the state of the art.

CENTREX OPTION AVAILABLE. For organizations that use Centrex, the Xiox Centrex Adapter allows the collection of SMDRs from the output port of the Centrex switch. The Xiox system processes this input to give you information about your telecommunications expenses before the bill arrives at the end of the month.

The Xiox Centrex Adapter is suitable for many-line Centrex users. Smaller Centrex users can use a Tip and Ring Scanner to collect information. This device monitors the pair of wires attached to each telephone and records all dialing tones and circuit pulses. Devices are available to scan upwards of 2,000 lines. With the aid of a Tip and Ring Scanner, even small Centrex users can use the Xiox software.

If you need strong organizational directory sorts, fast performance, and easy-touse screens-and if you can live without true V&H costing-the Large Business Series could be for you. The pricing strategy may seem a little steep, but it does include I year of Xiox support.

Frank J. Derfler, Jr., is workgroup systems editor of PC Magazine. Greg Campbell is an information systems manager with the federal government.



multiple recipients. Automatically dial up the receiving fax and keep on dialing if it's busy.

And because it's all done in the background, you have all the power of your PC to boot. All you need is an IBM PC or

compatible with a hard disk and graphics board. And a willingness to face the fax. For more information and the dealer nearest you, call

FOS EARES WITH E TOU SLEEP.

(800) 634-5558.



THECOMPLETERO

CIRCLE 264 ON READER SERVICE CARD

Maximize the output.



It's never been simpler to create extraordinary-looking documents. Thanks to MultiMate* and Hewlett-Packard.*

If you purchase MultiMate Advantage II™ before August 31, 1988, we'll give you a free MultiMate Advantage II LaserJet Printer Kit.

It's a \$200 value that makes any doment look absolutely priceless. You see, the kit helps you get more out of your Lasenlet*+, Lasenlet 500 or LasenJet Series II printer than you ever thought possible. In fact, you might even say it lets you

take advantage of its full capabilities. Just look at all you get:

Sixteen popular business soft fonts in sizes from 8 point to 24 point. So you can make subtle points or bold ones.

An Applications Booklet that helps you make the appearance of your documents just as brilliant as the content. You'll get step-by-step instructions to help you create a range of page designs and layouts.

And in the Ashton-Tate* tradition, we'll still be there to lend a helping hand long

Minimize the effort.



after you peel the shrinkwrap off the package. Ashton-Tate and Hewlett-Packard have joined forces. Anytime you have questions about MultiMate Advantage II or your Hewlett-Packard LaserJet printer, just call our technical support hot line.

Ashton-Tate and Hewlett-Packard are standing by with the answers.

Free through August 31, 1988. You get the entire kit absolutely free—including all the fonts, all the page layouts, and all the technical assistance you need for 90 days. Which means all you have to pay for is MultiMate Advantage II, the perfect complement for your Hewlett-Packard LaserJet printer.

For more information, or the dealer nearest you, call 1-800-437-4329, ext. 262. MultiMate Advantage II and the LaserJet Printer Kit.

When you have both, your document won't be the only thing that looks smart.



Ashton Title, the Ashton Tate, logo and MultiMate are registered trademarks and MultiMate Advantage II is a trademark of Ashton Title Corporation. General Notice. Some of the

WITH NEW TIME LINE 3.0, PROJECT HEADS WILL NEVER LOOK LIKE THIS.



ANNOUNCING THE "NO SWEAT" APPROACH TO PROJECT MANAGEMENT. Running a project can be like running a marathon.

Unless you run it with Time Line 3.0. Because with Time Line 3.0, you'll win even the biggest, longest, most grueling project management races. Without

breaking a sweat. Imagine, Gather your list of tasks and type each of them into an easy-to-use Time Line task form, Voilà, Time Line 3.0's powerful project outline* organizes your Gantt for you, listing major project areas as headings and detailed tasks underneath. Now, hit a

couple of keys and "collapse" the entire outline so only your major headings show. That's the big picture. Hit the "+" key and bingo. The outline expands to show you every little detail. Zoom in, out, around, and through even massive projects at the touch of a key. Never before have project managers had so much control, so fast. And so easy.

But how about power? Can Time Line handle huge, multiple projects? No sweat. Interactive, editable on-

EASY, FLEXIBLE, POWERFUL PERFORMANCE: Unlimited level Outline Structure integrated throughout; open or close

at any level.

• Interactive PERT shows hierarch (outline) as nested boxes; open only what you need to see. Toggle between two PERT layouts to see the overall project or zoom in on specifics.

project or zoom in on specifics.

Custorinatible Gintt with userdefinable screen layouts. Add
columns to show dates, resonante
with histogrants for up to 5 resource
with histogrants for up to 5 resource
with histogrants for up to 5 resource
with a common analysis.

Multi-Project Management with no
linking required. Outline organizes
multiple projects in a single schedule

· Project Journal acts as outline based scratch pad and Notes attaches reminders directly to tasks or

Baseline tracking produces Actual vs. Plan Gantt. Cost tracking records "actuals" and percent complete. Supports government reporting requirements (C/SSR). Calculates earned value and supports WBS and

OBS numbers.

Virtual Memory supports 1000 tasks with 640K RAM (1600 tasks with EMS extended memory).

Customizable report generator is form driven to make it even easier.

Virtual Filipho to Attended.

Built in links to Artemis and Tellaplan.

screen PERT charts give you either a summary view of all task relationships, or (with a single keystroke) a detailed view of individual tasks. Resource leveling across projects insures that scheduling "job-shop" environments never turns into "sweat-shop" project man-

agement. And, completely cus-

tomizable output means you can easily design and print specialized reports.

Editor's Choice '86 and '87

For your boss, your crew, and for yourself, Time Line works hard, Works fast, And makes your work look great. For only \$595.

48 OF THE FORTUNE 50.

Nothing sweats the details like Time Line 3.0. Maybe that's why it's the choice of 48 of the Fortune 50. And has won every major project management award...it's #1, year after year. And, it's the best seller. Easy to use and packed with power: Time Line 3.0 technology is so advanced there are patents pending. Call

(800) 888-0886 Ext. 420P for a FREE demo disk (a \$9.95 value) or FREE corporate evaluation. Time Line 3.0: the most powerful anti-perspirant for project managers.

The #1 Project Manager



SYMANTEC. "Think Tesh, the original auditor processor from our Living Visipeters Division, set the standard in outlining technology of Time Line 2 G, wind PY. Mayesiane Editors and the standard in outlining including of Time Line 2 G, wind PY. Mayesiane Editors and the standard control of the standard in outliness of the standard of the standard control of the standard of the standard of the standard control of the standard of

POP-UPHELP: INSTANT ANSWERS at your FINGERTIPS

Need help fast? Don't turn to the documentation. Try a pop-up help program and get the information you need with the touch of a key.

ike a poorly prepared, overpriced meal, most software documentation leaves PC users unsatiated and decidedly unsatisfied. Let's face it-many of the commonly used help resources are ill-conceived, inadequate, inaccessible, or unintelligible. Too often the company computer guru or the expert for a particular application is unavailable when help is needed. The product's manual or third-party manuals are commonly shelved somewhere in the bookcase down the hall. Keyboard templates and flipcard booklets that sit by your computer are too brief to answer more-complicated queries. Where can the novice, the experienced user who needs a reminder, and those attempting to expand their proficiency turn for help when questions start to arise and confusion sets in?

An emerging class of software—pop-up help utilities—makes help available when you need it without making you leave your desk, the

problem, or the program. You can call these memory-resident help programs to the screen with one keystroke. With pop-up help tuilities you can retrieve the information you need instantaneously, so you can get back to work without losing your train of thought. It's a superior solution in a domain of technical references and resources that miss the mark in their primary function—user support.

RAM-resident help utilities can increase productivity in several ways. Even after an intensive training grogam, a newcomer to a particular program will find that a pop-up-help utility can give him the continued support he needs to feel comfornable with a new program. Others, such as those who need to learn a program on their ornivell find that many pop-up help ornivell find that many pop-up help of the companies of the companies of the fective to learn a program by using it rather than by reading about its features. And pop-up help utilities will guide you through the exact sexquences of keystrokes necessary to perform a particular operation.

RAM-resident help programs run off a central engine, or compiler, that calls one of several databases. Once a company has developed the engine, it 8 a simple mate to offer additional databases. And after you've become familiar with the workings of a particular engine, it's simple to use that same help system to learn another apnilization programs.

Newcomers to a particular application aren't the only ones who can benefit from pop-up help programs. Infrequent users may get rusty about the specifics of a particular program if they use it only to produce a report once a month.

Programmers comprise another market for pop-up help utilities, which allow them to find the proper syntax for their compiler without digging through the manual or other books. The list of RAM-resident help utilities that help programmers program includes The Norton Guides, from Peter Norton Computing, which has databases for assembler, BASIC (Turbo Basic, OuickBASIC 3.0, and BASICA), C (Turbo C and Microsoft C), and Turbo Pascal (see First Looks, PC Magazine, December 8, 1987, page 56); Copia International's Peabody Guide for Turbo Pascal (see First Looks, PC Magazine, February 16, 1988, page 56) and Peabody Guide for C: The Resident Expert System, from Santa Rita Software, which has databases for Turbo C. Lattice C. LetsC. Microsoft C. Turbo Pascal, Turbo Prolog, and a Programmer's Reference Guide; Flambeaux Software's TECHelp!, which contains technical information about IBM PC/XT/AT-compatible computers; and Second City Software's Instant Help for MS-DOS Programmers and Instant Help for BASIC Programmers.

Programmers may also want to incorporate pop-up help screens into their programs. Help!!, from Goldata Computer Services; High Screen, from Softway; and Bay Soft's Pop Screen make it easy to include help screens in the applications you write.

Even if you're not a programmer, you can still integrate customized pop-up help screens into applications—there are several engines available that allow you to create your own pop-up help screens for inclusion into any program. You may want

to use such a grogram to built por-up belief lies that include ranc charts, reference tables, or the command sequences necessary to accomplish a company-specific tast. These pop-up help engines often include an editor to design and link help secrois an editor to design and link help secrois with a user-defined hotdey. Products that allow you to rearbe your own pop-up help secross include Flaint Up. From Software Boiling, The Pointer, from Sun Enterprises, Folleris Rescue, from Polaris Soft-point Rescue, from The Software (1997). The Contract Rescue, from Polaris Software (1997). The Software (1997) is possible (1997).

■ If the help is unintelligible, it isn't going to be of any benefit to anyone.

Sytems' KeyNotes; and On-Line Help, from Opt-Tech Data Processing. (The compiler for The Norton Guides lets you create your own databases, but you cannot purchase it separately—you must buy it with one of the language databases.)

At this time we will be looking at RAM-resident unities with ready-made databases for DOS, application programs, and writers. Several companies have a few entries in the populy help market that use the same basic engine. The Quickets feeries includes Lottas 1-2-3, DOS, and Microsoft Word help programs. Soot Documentation offers help with 1-2-3 and DOS, and the KeyNotes Microsoft Soot Polyson Microsoft Word Lottes Style Book and the KeyNotes Writers.

which is also available separately.

Not suprisingly, there are more pop-up help programs available for DOS than for any other programs. We have reviewed seven of them here: Boston Doc for MS-DOS Users, from Boston Documentation Design; Flambeaux Software's DOS Helpt; DOS Helpt; from American Training International, DS Help, from Design Software; Helpt Postware; Helpt Post-Help; and the DOS database for The Help; and the DOS database for The Mills.

dent Expert System, from Santa Rita Software.

An application program for which popup help utilities are common is Lotus 1-2-3. We have reviewed three: Boston Doc for Lotus 1-2-3, from Boston Documentation Design; American Training International's 1-2-3 QuickRef; and Sherpa for 1-2-3, from ComTrain.

Also reviewed are two aids for writers from Digital Learning Systems, Keynom Digital Learning Systems, Key-Notes/Associated Press Sylebook and KeyNoace Wire's Handbook, American Training International's Word Quicked Fig. 102, a pop-up help utility for a grab bag for Microsoft Word; and Diamoth Growth of the Conference of the Confer

Unavailable at review time were fucrored spous pluel guides based on the Polaris Rescue engine and Copia International's Pendor Guide for DOS. As the publishers of the Quick Reference Guide Series for popular application programs in book form and keyboard template it is resis, Microrel has been a PC help resource for several year now. Copia Internation of the Copia Copia Internation of the Copia Copia Internation of the Copia Copia International Copia Copia International Copia Copia Copia Copia International Copia Copia Copia Copia International Copia Copia

program for your specific uses.

What are some of the criteria to keep in mind when you're selecting a pop-up help program? It's important that the pop-up help program isn't just one more compli-

OUR REVIEWERS

Christopher Barr is the manager of PC MagNet. Edward Mendelson is a professor of

English and Comparative Literature at Columbia University and is a contributing editor of PC Magazine.

Catherine D. Miller is an associate editor of PC Magazine.

editor of PC Magazine.

Marianne L. Myers is an accounting services consultant and has written several articles on using PCs for financial nurposes.

cated and difficult program to learn. The user interface must be intuitive and easy to use. The menu structure of the program should be consistent, so that it's easy to find the needed information. Both the language and organization of the material within the program must be consistent, so that the user can find and understand the procedures in question. The material must be organized within the menus in a logical manner, so that finding a particular bit of information doesn't require an inordinate amount of guesswork. And each item should be sufficiently cross-referenced. If the help is unintelligible, it isn't going to be of any benefit to anyone. And finally, the material itself must be accurate and current: outdated and erroneous information can be much more damaging than Other considerations include the mem-

Other considerations include the memory requirements of the program, whether it's compatible with the other RAM-resident programs you use, whether you can toggle between the application and the program, and whether the program has printer support.

Pop-up help utilities put help on your PC screen when you need it. You can expect to see numerous entries in this relatively new software category in the coming years.—Catherine D. Miller

POP-UP HELP FOR

DOS

Boston Doc for MS-DOS Users

You may need a help program to run this help program. Boston Documentation Design's \$34.95 disk-based reference guide to DOS forces you to navigate an endurance course of interlocking programs and baffling menus. And you can't even count on reaching safe harbor and useful information at the end of the strugele.

Nothing is simple about Boston Doc for MS-DOS Users. To use it as a pop-up, you don't do anything as obvious as loading a help program. Instead, you first load a separate program called Switch-II. Switch-II installs itself in memory and gives you a



Finding your way around the documentation disk that comes with Boston Doc for MS-DOS Users can be a confusing process. If you press Enter while the highlight is on NEXT, you'll jump from DISKCOMP to a discussion of hard disks. Notice that you don't see the syntax of DISKCOMP on the initial help screen for the command.

command to type if you want more information. Just don't try to use that command to find out about DOS. It merely displays a text screen that invites you to send in \$49 for a fuller version of Switch-It that lets you jump between application programs.

You have to look in the manual to learn that you must press Alt-1, he help with DOS. When you press Alt-1, you still door to green that prompts you to enter the name of a Boston Doe file. You obediently type "DOS" and are furnished a bright opening screen. Press a key, and you are at last rewarded with a table of contents.

Now the fun begins. You move the cursor down to the subject that interests you and press Enter. A window pops open with some basic information, and the words STRUCTURED READING appear vertically on the left of the screen. If you want more than the few crumbs offered in the first, window, you street the cursor. The street was the street of the screen with the street was the street of the street with the street was the stree

If you cursor over to Xref (meaning "cross-references"), keywords stibilinking at you all over the screen. Boston Documentation Design claims that its DOS help file includes 1,600 cross-references, and they all seem to blink at once. You move an arrow up and down the edge of the window to choose the line that con-



necessarily the ones you expect.

Sizzling products

□ 3½" format available from us. Specify

when ordering. E package includes both 51/4" and 31/2"

El 31/2" formet available from manufacturer by request. Call us for datails. CP-copy-protected, NCP-not copy protected

SOFTWARE

We only carry the letest versions of products.	
Version numbers in our ads are current at press	;
time.	
Alpha Software NCP	
□ Keyworks 3.0 (macros)	
□Artyanced Keyworks 1.0 175	
□ALPHA/three 1.1 (dB3 file compatible). 219	
American Small Business Computers	
Design CAD 3.0 (NCP)	
□Design CAD 3.0 (NCP)	
EDesign CAD 3D 1.1 (NCP)	
Application Techniques NCP	
@Pizazz Plus	
Ashton-Tate NCP	
□dBASE III Plus 1.1cal	I
@MultiMete Advantage II 1.0 299	
☐Master Grephics Pack	
Best Progrems NCP	
□Label Master 3.1 (mailing label program) 29	
Rible Research NCP	
THE WORD 4.0 (specify KJV or N/V) 159	
Bloc Development NCD	
FormTool 2.01	
Perland International NCD	
□Turbo BASIC 1.1 67	
□Turbo DASIC 1.1 67	
□Turbo Pascal 4.0 67	
□Superkey 1.1	
□Reflex 1.1	
□Eureka 1.0	
ESidekick Plus 1.0 129	
Peredox 2.0 (eesy-to-use detabase) cal	I
Broderbund CP	
□Print Shop	
Print Shop Companion (tools for Print Shop) 33	
☐Memory Male 3.01 (NCP)	
Chipsoft NCP	
BTally Ho 1.01 (finencial calculator)	
Computer Associates NCP	
#SuperCaic 4 1.1	
Crosstalk Communications NCP	
Crosstalk XVI 3.61	
Crosstak XVI 3.61	
Dec Software NCP	
Dec Software NCP	
□Dac-Easy Payroll 3.0	
Dac-Easy Light 1.0	
Dac-Easy Accounting 3.0	
□Dac-Easy Bonus Pak 3.0	

Digital Research ... NCP

Gem Draw Plus 2.01

Gem Desktop Publisher 1.1. 259.

PC Connection Software Special	
through August 31, 1988	
n Edge Software NCP slips III 3.3	

Rated 9.3 by InfoWorld, Timeslips III is e memory-resident time end bitling system for lawyers, accountents, consultants and other professionals. A built-in "stop-watch" times any phone call or ectivity as you work. Then automatically calculates the fee and updates your client file.

. Use the 2,000 cherecter description field for narrative bills · Procedural macros eutomete report end billing functions . The Custom Report Generator exports data to env program that accepts ASCII files like Lotus 1-2-3 and dBASE

For XT, AT, PS/2, and compatibles (requires 512k, 1 floppy & 1 herd drive; 31/2" avaitable) \$119.

Executive Systems ... NCP □XTREE Pro 1.0 5th Generation ... NCP RFastback Plus 1.01 ... Funk Software ... NCP PC LOGO 2.0 89 Hayea ... NCP coll □Smartcom II 3.0 · · · · · · Hilgreeve Software ... NCP □HyperACCESS 3.2 Individual Software ... NCP

Intuit ... NCP □Quicken 2 0..... Javelin Software ... NCP Lifetree ... NCP □1-2-3 2.01 (now not copy-protected) call □Symphony call

101 Macros for. 1-2-3 dBASE III Plus WordPerfect Excel eech 42. □Managing Your Money 4.0 \$125. Meridian Technology ... NCP Microlytics ... NCP □Goler 1.0 (text retneval system) 45. □Wordlinder 4.0 (electronic thesaurus).... 35. MicroPro ... NCP □WordStar Professional Release 5 259 □WordStar 2000 Plus Rel. 3 (Personel Ed.) 259 Microrim ... NCP R: BASE for OS/2 (31/2" disks only)..... 599 Microsoft ... NCP □Leerning DOS (for env DOS version) 35 □Windows 2.03 69

Bookshelf 1.0 w/Amdek Laser Drive 799 EExcel 2.0 (requires 80286/80386 CPU) . 319 LANGUAGES Cuick BASIC 4.0 69 Migent ... NCP FAbility Plus 1.0...

. 105

Monogrem ... NCP □Dollars & Sense 3.1

Nantucket Software ... NCP

EClipper (Summer '87, dB3 Plus compiler) 399 New England Software ... NCP

Nolo Press ... NCP North Edge Software ... NCP Owi International ... NCP Peperback Software ... NCP □VP-Planner Plus 2.0.....95 □VP-Expert 1.2 (expert system) 65 Peul Mace ... NCP □H/Test-H/Format 2.0 (hard-disk tools) 49

Personal Computer Support Group Personics ... NCP 89. ■Norton Guides (C. Assembler, Basic). each 55 Quarterdeck ... NCP DESQView 2.01 (operating environment). . 79

Revolution Software ... NCP

For IBM Personal Computers exclusively.



at cooooool prices.

Simon & Schuster NCP Typing Tutor IV	PC Connection Hardware Special through August 31, 1988
□Software Carousel 2.02	IOMEGA 1 year Bernoulli Box II
CPFS rest Publisher 2	The Benrouli Box from ICMEGA has long been elsowing socious for your mans been elsowing socious for your mans and been elsowing socious for your mans and adat cartidges, storage a unimitade, and your valuable data can be looked up for both the socious for the socious fo
Traveling Software NCP © LAP-LINK Plus 1.0. 85.	
EDeskink 99.	Chuck Yeager's Flight Simulator 32. Infocom NCP
□True BASIC 2.01 (now includes Runtme) 57. Vericomp NCP ■SoftBytes 2.0	Hitchhiker's Guide
SoftBytes 386 2.53 49. WordPerfect Corp NCP WordPerfect Librery 2.0. 69.	□F-15 Strike Eagle (requires CGA) 22. □Gunship (requires CGA or EGA) 32 Microsoft CP
□WordPerlect 5.0. 255. ■DataPerlect 2.0 299.	☐Flight Simulator 3.0 (reqs. graphics brd.) 35. Mindacape CP
WordTech Systems NCP □dBXL 1.2 119 Xerox NCP	□Balance of Power (reqs. graphics brd.) 30 Parior Software CP □Bridge Perior (best Bridge simulation) 49.
BlVentura Publisher 1.1	Sierra On-Line CP **Leisure Suit Larry (requires CGA or EGA) 25
EDUCATIONAL	#Spece Quest II (requires CGA or EGA) 33. #King's Quest III (requires CGA or EGA) 33.
Barron'a CP Computer SAT	EPolice Quest (requires CGA or EGA)
Stone & Assoc NCP (regs. graph. brd.)	®Tetris (addicting mind feaser)

Stone &										
My Lette										
Kids Stu										
True BA										
B Ingonor	netry									
E Algebre										

RECREATIONAL

Accolade CP (regs. grephics brd.)	
B Herdball (baseball simulation)	1
# Testdrive (driving smuletion)	2
Electronic Arts CP (regs. graphics bro	u
Chessmaster 2000	á

PC Connection Hardware Special through August 31, 1988

IOMEGA ... 1 year Bernoulli Box II

Hitchhiker's Guide Zork Tritogy Microprose ... CP Microsoft ... CP □Flight Simulator 3.0 (regs. graphics brd.) . . 35

King's Quest III (requires CGA or EGA). . . . 33. Sphers, Inc. ... NCP Tetris (addicting mind teaser) ■Falcon (F-16 simulation, regs. graphics brd.) 32

Sublogic ... NCP □NFL Challenge 1-800/243-8088

6 Mill Street

510M Marlow, NH 03456 603/446-3383 FAX 603/446-7791

HARDWARE

Manufacturer's standard limited warranty pe for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research ... 2 years

I/O MIN 2 G/S/P	
SxPakPlus 64k C/S/P	
(now upgrades to 576k)	c
SxPakPremium 256k C/S/P	
(upgrades to 1 Meg or 2 Meg w/Piggyback)	c
Advantage Premium 512k S/P	
(upgrades to 1 Meg or 2 Meg w/Piggyback) .	С
Advantage 2 512k /for PS/21	c
RAMpagel 286 512k (upgrades to 2 Meg)	c
Hot Shot 286 (10 MHz)	39
Amdek 1 year	
410A (amber monochrome monitor)	15
	62
Compucable 2 years	
2-Position switch box	2
3-Position switch box	3
Cuesta 1 year	_
Datasaver 400 Watt (standby power unit)	45
Curtie lifetime	
23/40/223004	

Disk Holder DB-1 (holds 50 51/4" disks) 8. Printer Stand PS-1 . . DS-1 Switch Box (controls 2 printers) CABLES Smertmodern-to-PC Cable (9 feet) 17 Printer-to-IBM cable /9 feet) 17. SURGE SUPPRESSORS Salestrip SP-3 (6 outlets; 1 year wrty.) 21 Diamond SP-1 (6 outlets)..... Ruby (6 outlets; EMI/RFI filtered; 6 ft cord) . . . 59. Ruby-Plus (w/FAX & modern protection)

Irma 2 (3270 emulation board) 729. Epson ... 1 year We are an euthorized Epson Service Center. FX-850 (80 col., 264 cps, 9 pm) call FX-1050 (136 col., 264 cps, 9 pin) call LQ-500 (80 col., 180 cps, 24 pin) call LQ-850 printer (80 col., 264 cps, 24 pin). . . . call LQ-1050 printer (136 col., 264 cps, 24 pin). call LQ-2500 printer (136 col., 324 cps, 24 pin). call LX-800 printer (80 col., 190 cps, 9 pin) call

1200 Baud Internal Modern 2400 Baud Internal Modern 5th Generation ... 6 months Logical Connection 512k. 579. Hayes ... 2 years Smartmodem 1200

Everex ... 1 year

Smartmodem 1200B (with Smartcom II) . . . Smartmodem 1200B (no software)...... 265.

For IBM Personal Computers exclusively.

Call 800-243-8088.

Smartmodern 2400
Smartmodern 2400B (with Smartcom II) 449.
Horryles 2 years
Graphics Card Plus
Network Card Plus (with TOPS DOS) 349.
Graphics Card Plus. 189. Network Card Plus (with TOPS DOS) 349. Intel 5 years
2400B Modern 2 (internal modern for PS/2
Models 50/60/90)
Inboard 386/PC w/1 Meg 989.
Inboard 386/AT Øk (req. installation kit) 969.
Inhoard Installation Kit (specify computer) 139.
Aboveboard 286 512k
Aboveboard PS/286 512k S/P 419.
AboveBoard 2 Øk /for MicroChannell 279.
8087 (for IBM-PC & XT)
8087-2 (for PS/2 Models 25 & 30)
80287 flor AT & XT2861
80287.8 (by 8 MHz 80286 machines) 249.
R0287-10 /for PS/2 Models 50 & 601
80387 /for 16 MHz PS/2 Model 80)
80387-20 (for 20 MHz PS/2 Model 80) 749.
Kensington Microware 1 year
Masterpiece
Masterpiece
key tronic 3 years
101 Keyboard (enhanced layout)
Kraft 1 year
Three-button-loystick
Three-button Joystick
Genius Mouse Model GM-6 Plus 59
Microsoft lifetime
SPECIFY BUS OR SERIAL VERSION
Mouse with Paintbrush 109.
Mouse with Easy CAD
Mouse with Windows and Paintbrush 145.
Migent 1 year
Pocket Modern (1200 baud, incl. software) 119.
MCC Technologies illetime
SPECIFY BUS OR SERIAL VERSION
PC Mouse w/PC Paint+
PC Mouse w/Autosketch
NEC 2 years
Multisync II (800 x 560 max. resolution) call
NSI Logic 3 years
Epic 480 (extended EGA)
Smart EGA Plus (supports 800x600 res.) 179.
Orchid Technologies 2 years
Tirry Turbo 286
Designer VGA
PC Cooling Systems 1 year
REPLACEMENT POWER SUPPLIES
Turbo Cool 150 (run 25° - 40° cooler) 129.
Turbo Cool 200 (run 30° - 45° cooler) 169.
Silencer 200 (69% noise reduction) 149.
Practical Peripherals 5 years
Microbuffer Inline (per print buffer w/32k) 129.
1200 Baud Internal Modem (wProComm) 69.
1200 Baud External Modern 109.
2400 Baud Internal Modern 159.
2400 Baud External Modem 189.
Princeton Graphics 1 year
MAX-12E (amber monochrome monitor) 139.

Ultrasync (supports CGA, EGA, VGA) \$549.
Quadram 2 years
ProSync (with mouse)
Microfazer II Print Buffer 64k 249.
Toshiba 1 year
P321SL printer (80 col., 216 cps, w/tractor) 529.
P351SX printer (136 column, 216 cps) 999.
T1000 Laptop (80C88, 6.4 lbs., 5 hr battery) call
T1200 Laptop (80C86, 10 MHz, 20 Meg) call
T1200F Laptop (80C86, 10 MHz, 2 floppies) call
T3100/20 Laptop (80286, 8 MHz, 20 Meg) call
T3200 Laptop (80286, 12 MHz, 40 Meg) call
T5100 (80386, 16 MHz, 40 Meg) call
768k Ram Card for T1000
Video 7 2 years
VEGA Deluxe (supports 640x480) 219.
VEGA VGA (supports full VGA specs) 287.
DRIVES
IOMEGA 1 year
Bernouti II Single 20 Meg Internal (51/4") special
Bernouti II Dual 20 Meg External (51/4") special
20 Meg cartndge (51/4*)
Bernouti Box 40 Meg (8") 1679.
20 Meg cartridge (8")
PC2 Card. special
PC2R Card (hoodship cord for PCXT/AT) special

Video 7 2 years
VEGA Deluxe (supports 640x480) 219.
VEGA VGA (supports full VGA specs) 287.
DRIVES
IOMEGA 1 year
Bernouti II Single 20 Meg Internal (51/4") special
Bernoulli II Dual 20 Meg External (51/4") special
20 Meg cartndge (51/4*)
Bernoulli Box 40 Meg (8") 1679.
20 Meg cartridge (8")
PC2 Card special
PC2B Card (bootable card for PC/XT/AT) special
PC4 Card (for PS/2 Model 50/60/90) special
Mountain Computer 1 year
40 Meg Internal Tape Drive (XT, AT or PS/2). 379.
40 Meg External Tape Drive (XT, AT or PS/2) 479.
40 Meg External Tape Drive w/Power
Supply (XT, AT or PS/2)
Plus Development 1 year
Hardcard 20 Meg (49 ms)
Hardcard 40 Meg (39 ms)
Seagute 1 year
FREE PCTV® Hard Drive Installation Tape with the
purchase of 20 Meg Seagate drive for the IBM PC
(not for AT). Specify Beta or VHS.
20 Meg Internal Hard Drive ST225 (w/controller
and cables, 65 ms)
30 Meg Internal Hard Drive ST238 (w/controller
and cables, 65 ms)
40 Meg Internal Hard Drive for AT (40 ms) . 439.
40 Meg Internal Hard Drive for XT
(w/controller and cables, 40 ms) 499.
TEAC 1 year
PC, XT 360k Drive (51/4" half-height) 99.
720k Drive (31/2" half height, specify XT or AT) 99.

AT 360k Drive (5¼ "half-height)	. 99.
1-800/243-808	8

Toshiba ... 1 year

PC Connecti 6 Mill Street 510M Marlow, NH 03456 603/446-3383 FAX 603/446-7791

DISKS	
All disks have a lifetime warranty.	
51/4" DS/DD Dlaks for PC & XT (360k)	
Fui MD2D (10 disks per box) \$12	2
Sony (10 disks per box)	2
Maxel MD2-D (10 disks per box)	3.
Verbatim Datalile (10 disks per box) 13	ŝ.
51/4" DS/High Density Disks for AT (1.2 Meg)	
Fui MD2HD (10 disks per box)	2.
Sony (10 disks per box)	3.
Maxell MD2-DD /10 disks per box)	3.
Verbatim Datalife (10 disks per box)	2
31/2" DS/DD Diskettes (720k)	
Sony (10 disks per box) 18	3.
Fuii (10 disks per box)	Э.
Maxell (10 disks per box)).
31/2" DS/High-Density Diskettes (1.44 Mog)	
Full (10 disks per box)	5.
Maxell (10 disks per box)	9

MISCELLANEOUS						
					24.	
					32.	
					15.	
					19.	
					22.	

OUR POLICY

- We accept VISA and MASTERCARD No surcharge added for credit card orde · Your card is not charged until we ship. If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.). No sales tax
- · All US shipments insured, no additional charge · APO/FPO orders shipped 1st Class Mail, charged by weight Allow 1 week for personal and company checks to clear
 - . COD max \$1000 Cash, cashier's check, or money order 120 day limited warranty on all products. To order call us anytime Monday thru Finday 9 00 to 9.00, or Saturday 9.00 to 5.30. You can call our business offices at 603/446-3383 Monday through Friday 9.00 to 530

SHIPPING

- Note: Accounts on not terms pay actual shipping. Continental US: · For montors, printers, Bernouli Boxes, and computers,
- pay actual charges. Call for UPS 2nd-Day & Next Day-Ar.

 For all other terms, add \$3 per order to cover UPS Shipping For such tems, we automatically use UPS 2nd Day Air at no extra charge if you are more than 2 days from us by UPS ground.
- For monitors, printers, Bernoulii Boxes, and computers. actual UPS Blue charge will be added. For all other terns, add \$3 per order Alaska and outside Continental US: Call 603/446-3383 for information.

For IBM Personal Computers exclusively.



PC Pedestal.

Wanna get high?

(Or, how we dig our roots.)

A ach year the local color gathers on the green of memorable Marlow, NH (pop. 554) to pay their respects to our furry founder. We wave our flags, doff our hats, toot our own horns, and gather renewed strength for another year of lofty service. For it was he (or was it she?) who had the voluminous vision and towering talent to lead Marlow onto the cutting edge of micro mail order.

Giving us credit where credit is due.

But, if the truth be known, it is our customers whom we put on a pedestal. From day one, we have striven valiantly, to follow our ideals; to sell only the latest versions of products, not to advertise new products until they are actually available, not to charge your credit card until we ship, and to provide intelligent insights and salubrious service before and after the sale.

So, as you review our parade of programs and other paraphernalia, you can rest assured that when you buy from PC Connection you are dealing with a company that's wily as a fox, quick as a bunny, daffy as a duck, and, of course, righteous as a raccoon.

Statuesque savings and a free gift to boot. Remember when computers were going to make paper obsolete? fnstead, they churn out unmanageable quantities with reckless abandon. That's why you need an

official PC Connection Founder's Statue which can also do veoman (or is it Yo, Woman!) service as a paperweight. Tie me kangaroo down, sport-it's free with an order of \$500 or more

between now and September 30. Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00;

Saturday to 5:30. ff you're planning to visit please call ahead.



tains a blinking keyword. A smaller window now opens and invites you to choose the keyword that you thought you had chosen already. It turns out that the program and you now have to use the Lip or Down Arrow keys inon-wel felt or right to pick the keyword you really want. (Are you following this?) When you finally zor to looking the contract of the property of the young that the young that you for the young that you had been a property of the young that you had been a property of the young that you had been a property of the young that you had you

If you panic and try to get out by pressing Esc, the program asks if you really want to exit. Answer yes, and you re still not out. You're merely back in Switch It again, and you have to press All-1 to get back to where you started.

You can simplify matters by running the program from the DOS command line in rather than as a pop-up-but only if you ignore the manual. If you follow the printed instructions that tell you to enter WBREAD DOS—GO, you will be toosed back into DOS with a misspelled error will be too the printed to the printed with the program can't find a database file. Just leave out the—GO, and you'll do fine, more or less.

Boston Doc's DOS help file is dated June 1987, almost three months after the release of DOS 3.3, but it only covers commands included in MS-DOS 3.1. You'll have to look elsewhere for XCOPY or DRIVER.SYS or a half-dozen other recent commands.

The TSR version takes up only 20K when you're not actually using it, but needs 100K more every time you ask for help.

The package includes a disk-based tutorial that's even more confusing than the program itself. It even admits that you won't understand it. You can print out items from the help file if you'd rather be confused by paper than by the screen. —Edward Mendelson

DOS Help!

if you have a choice, get help from a source with looks as well as brains. Flambeaux Software's \$34.95 DOS Help! sports a sleek, elegant screen and has an endless supply of lucid, up-to-date infor-

DOS Help! 3.3a - Id Help Id Exit The SUBST Command Purpose: Assigns a 1-letter drive iD to a directory path. DOS 3.1+ · allow obsolete software to work with pathnames · save yourself some typing of long pathnames · generally give yourself the advantages of tree-structured directory system without the associated hassie Usage: SUBST Ed: /Di SUBST d: d:\path full pathmane of an existing directory -Remarks: The first parameter identifies the drive ID you want to use when you refer to a directory. The second parameter is the pathname of the directory you want to access as if it were a separate drive. The DOS Configuration command LASTDRIVE= (in your CONFIG.SYS file) determines the drive IDs you may use as substitutions. The default LASTORIVE is E, so you can substitute for A, B, C, D, and E. If you

Flambeaux Software's DOS Help! gives you a readable screen packed with information. With one keystroke you can cut the help window in half and type at the DOS prompt in the other half.

mation about DOS. It can even give you maintain their with a DOS command when you need it most—while you're bying it. XCOPY? When you're ready to use the command, just type XCOPY at the DOS prompt, his a bokey, and watch a sorcen pop up with everything that you need. No memus to miyajue, no advertising to push memus to miyajue, no advertising to push memus to miyajue, to advertising to push community of the properties of the XCOPY and jumps directly a tin XCOPY XCOPY and jumps directly a tin XCOPY xcene. Now press Esc, and you're back in DOS again, ready to finish typing the command with the syntax given by the pro-

gram. You don't even have to be at the command line to get this kind of help. If you're cliting your CONFIG. SY's file in your word processor and need the arcane details of the DEVICE—DRIVER. SY's command, just press the hotkey after typing 'device,' and DOS Help't tells you what you need. Cross-references are copious, clear, and instantaneously availatineously.

If you don't want to run DOS Help! as a TSR, you can simply enter HELP XCOPY at the DOS command line and get the same result. Or simply run the program and browse through the menus, DOS Help! in-

cludes quick command summaries and glossaries for beginners, plus a lucid introduction to DOS. You don't even have to know the name of the command you're looking for, because the program gives you hints for finding the right one. But it also reminds advanced users of syntax differences among DOS versions and offers valuable advice about incompatibilities and dangers.

Many other help programs look like on-





ROAD WARRIORS



INTRODUCING ZENITH'S NEW BATTERY-POWERED PORTABLES.

ZENITH INNOVATES AGAIN—with a state of the art family of battery-powered portables led by the single most revolu-

Linuary portable ever created. TurbosPort 386: "urbosPort 388 is breakfrough linible and out. Outside Zenitin's exclusive Page White" display virtually duplicates printed page clarity. Its sharp block images are refreshed quickly on a flumenced brodit screen. Plus a billy detectable.

halde the compact furtisety of the ballety powered prices; continue with a powerful 80386 interoprocessor harnessed to a fast access 40MB hard disk. And zero with state techpolary for up to 50% greater speed (fifting other 20MB).

Next comes the lightweight SupersPort 286. The higher performance 286 class machine among all laptops.

pactops. With a choice of tast access 20 or 40MB hard a The third member of the pack is the SupersPort* with DMB hard disk or dual floppy systems and defachable ba

All three machines ride on Zenith's Intelligent Power
Management System* for madmum battery life.

Three new portables—three more reasons why Zenith to bothery-powered leader. For the name of your nearest in Oaro Systems Dealer, call 2-800-842-9000, see

ENITH C

data system

THE QUALITY GOES IN BEFORE THE NAME GOES ON

line paraphrases of the DOS manual, DOS Help! builds on hard-won experience in the real world. It mutters that JOIN is almost useless. It shouts that XCOPY is much faster than COPY. It explains the difference between BACKUP in 3.3 and earlier versions. It filters out rarely used details, like the binary switch for COPY, and leaves them under separate but accessible headings. It throws in information on memory usage and on the best settings for the BUFFERS command. And its keystrokes are the most intuitive of any DOS help program available.

You can remove DOS Help! from memory (it uses 60K) and customize its hotkeys and screen display. But the default setup works so well that you probably won't bother. You can toggle the pop-up frame from full-screen to half-screen size and then bounce it from the head of the screen to the foot. This helps you see what you're doing, but it makes the program's full-screen tables of contents slightly harder to use

Don't be put off by the opening screen, which looks as if it had been designed during Comdex under the influence of too much Las Vegas neon. Once you get past it, everything else looks right. The information's right, too. -Edward Mendelson

DOS-Helper

A session with Aristo Computers' DOS-Helper feels like a nostalgic visit to the Museum of Vintage Programs. Nothing's wrong with the data you'll find here. And nothing's really wrong with the \$35 program that presents that data. Like a wellpreserved vintage car, it gets you where you want to go. But you may prefer a car that doesn't make you turn a crank to start it. And you may prefer a help program that doesn't make you wait and then makes you type before it gives you any help.

Unlike newer programs, DOS-Helper scrolls on to the screen one line at a time rather than popping up. You can't move the cursor to the name of a command and press Enter. Instead, you have to enter the name of the command you want to learn about. If you mistype the name, the program drops you back to a laconic error screen, and you have to press another key

and: XCOPY - Copy entire tree directories - (E) (3.2) upical Usage: XCOPY A:GAMES C:GAME DIR /E /S [d:][path]XCOPY [[d:][path]fllespec | [d:]path[filespec] | d:[path][fllespec]] [d:][path][fi]espec1[/A][/D date][/E][/M][/P][/S][/V][/V] Function: Selective copy of whole directories, including subdirectories. Selectivity can be based on: date of file creation; status of archive bit; user's response to a prompt for each file. betailed Description: OTE: See "TREE-DIR" if you are not famillar with the subdirectory concept. PARAMETERS:

(t)<1>=Line Scroll; (Pulp)(Pulp)(Space)=PageScroll; (HOME)(END)=File Top.Bottom CTRL/P=print; (Tab)=Previous Help; DOS-Helper spells out every possible option on its data screens, but makes it difficult to pick out the most important details. For information on any DOS-Helper command, you have to type in its name at the bottom of the screen.

to get back to the full menu. At least you | can switch to a giant menu that lets you enter a number from 1 to 112 in place of names like CHKDSK or FCBS. A function-key menu along the top of the screen tells you to use F1 for help, and that F2 through F6 are "Unused!"

When DOS-Helper gets on your disk, it makes itself at home. It uses a separate file for the help information about each DOS command. Each of its menus and glossaries gets a separate file, too-making a total of 112 files in all. On a standard XT these fill 520K of disk space. This fact may encourage you to take a close look at the help file for the DEL command.

Some of these 112 help files aren't very helpful. All you'll find under MD and CD are suggestions to look under MKDIR or CHDIR instead. No one uses these long forms, so the program doesn't reflect the real world of DOS users-while wasting a whole file on a cross-reference.

The files that contain real information are accurate and detailed and use comprehensible English sentences. They include clear warnings about syntax changes between DOS versions and report that some commands are secretly available in versions where they aren't documented. But the screens are so awkwardly laid out that the facts you need aren't easy to find. Headings and text often appear on different screens. The headings all appear flush left, and different kinds of information get the same typographical treatment.

Select help:[





HALO DPETM





The handlest little scanner in the world just out even berter. The Handy Scanner 3000 from DFI offers you clarity and versatility in a little package. Like our other Handy Scanners, the Handy Scanner 3000 for the IBM PC. PS/2s and compatibles can handle almost all the jobs the desktop models can, but it's smaller and easier to use.

We give you the features you need the most in a Handy Scanner. The new 4-1/8" scanning width makes short work of the biggest pictures. You can switch the scanner between 400/300/200/100 DPI. For those really important pictures,

the Handy Scanner 3000 lets you have it all with 400 DPi resolution. The real-time screen display lets you instantly see your scan, so you can quickly make scanner adjustments as necessary. With adjustable half-tones and contrast, you get a

NO FLOWER ELECTRIC INSTRUMENT CO., [U.S.A.] INC. 2544 Port St., West Sacramento, CA 95691 Tel (916)373-1234 Fax (916)373-0221 DIAMOND FLOWER ELECTRIC [NORTHEAST]. INC. SC Joanna Court. East Brunswick. NJ 08816 Trl (2011390-2815 Fax. (2011390-2817



clean, clear nicture Two colors, not one, are used to so your originals, so cotors such as red or reddish skin ton can be scanned without losing detail.

The Handy Scanner 3000 comes complete with fu featured, powerful software for scanning, editing, as merging text with your graphics. Saved scan files are cor patible with almost all graphics software, includi-PageMaker, Ventura, WordPerfect 5.0 and many othe The package includes the scanner, interface card, t HALO DPE desktop publishing software package (wor \$195), a utility diskette and an instruction manual.

The Handy Scanner 3000 is a little scanner that does lot, and now it does it even better.

DISTRIBUTOR INQUIRIES WELCOME

CIRCLE 742 ON READER SERVICE CARD

CA MINEMORO BUPPLY CO. HIC CA TIC COMPUTER, INC	

NOW... 20 MHz DATA 286 SI: 22.5 (V 3.0) ASK Speed of CPU... Reting ?/ Running at?

REGARDLESS OF WHICH SYSTEM YOU WANT... IF YOU CARE WHAT YOU ARE GETTING...

DATAWORLD'S ANSWERS We have 80288-10 running et 10 MHz. and 80288-16 running et 18

Q/1 switchable on most systems

Wait States? Switchable? Is memory "peged" n-paged is fester Interleave factor on HD controller?

We have tham all

What type interface med. . SCSI, ESDI, 5T506/ST412 ? You can get well ove 400,000 bits/sec

Does your EGA offer 840 x 480 resolution?

Do you have a toll-fr

In your 30-day

you ship now, or

DATA-286 20MHz

80286 running at 20/10MHz. Phoenix or Award BIOS 1 MB of RAM expendable to 18 MB (2 MB on board) WD. 11 interleave dual hard disk controller 101-key keyboard with "click". Socket for 80287 EMS 4.0 support for memory over 1 MB. Real time clock Monographics cerd w/parallel port. TTL Monitor included \$1555.00

DATA-286 12 MHz AVAILABLE

Data 386

set and the set

DATA-286 10MHz

80286 running at 10/6MHz. Phoenix BIOS 512 KB of RAM expandable to 16 MB (1 MB on bo One 1.2 MB floppy drive. Dual floppy drive control 101-key keyboard with "click". Socket for 80287 Reel time clock with battery back-up. 200W power supply Monographics card w/parallel port, TTL Monitor included \$895.00

MARK MARK



Portacomp RAM (Exp to 1024 K) • 5 Exp aloft • Phoetra BIOS • 1 2 MB F loppy drive • 20 MB Hard Drisk Drive • 200W P/S • Super-hard backfil LCD 640 x 200 25 lbs



90286 CPU 12/8MHz ≈ 0/1 Wait ◆ Click K/B ◆ 512 K RAM (Exp to 1024K) ≈ 4 Exp slots ≈ Phoenic BIOS ≈ 720 KB Floopy drive ≈ 20 MB, 39ms, Hard Disk Drive ≈ Superhikal backin LCD 640 x 400 ◆ 20 bs. ◆ RGB PREFERRED COMPUTER SYSTEM

Dealer/overseas inquiries welcome In-Calif. 1-800-722-7734 Out-Calif. 1-800-722-7702

3733 San Gabriel River Parkway, Pico Rivera, CA 90660-1495

Prices subject to change

DOS-Helper doesn't cover DOS 3.3, but it does a good job with the earlier versions. If you feel that heaven helps those who help themselves, you can write your own help files to use with the DOS-Helper engine. And when you install your files, you can set up the program to access them when you frest so one of those "Unused!" function keys on the opening menu.

—Edward Mendelson

_ _ _ _

DOS QuickRef

American Training International's \$59.95 DOS QuickRef isn't very elegant, but it gets the job done. When you want help, you press the gray Plus key to open a halfscreen menu that lists general topics like "disk drives" or "creating and editing files." Move the cursor to the topic you want, press Enter, and you find a page or two of elementary information. Once the program gets your attention, it won't let you escape until it's finished with you. It makes you page through everything it knows about a topic before it lets you get back to DOS. Even when it first loads in memory, before you want to use it at all, it won't let you get back to DOS until you read its opening screen and press Enter.

Corresponding to the general topics listed on the gray Plus key, the gray Minus key brings up a small window with an alphabetical list of DOS commands. You scroll through it until you reach the one you want, wait a fraction of a second, and then read through one or more half-screens of sparse information. Some of this has a





DOS QuickRef doesn't show you very much on a screen, but at least it tells you how many more screens you have to read. This data screen on BACKUP is the first of five. The BACKUP parameters are explained on the later screens.

rather tenuous relation to the real world. BACKUP may be the most efficient way of backing up a disk using simon-pure DOS commands, but it isn't the easiest way available, as DOS QuickRef implies. The program won't warn you about the dangers of RECOVER, and you won't learn about the less common options of COPY. At least you can press Esc to get back to DOS without reading through all the screens. It's mildly disconcerting to find that in the help screens for individual commands you use the Left and Right Arrow keys to page from one screen to the next, and the Enter key does nothing-while in the general information screens you use Enter to page to the next

screen, and the arrow keys do nothing.

DOS QuickReft works only as a TSR
and occupies 80K of memory. You can't
tange the hotkeys if you need the gray
Plus and Minus keys for your applications.
To remove the program from memory,
you have to reboto or use one of the separate utility programs that manage TSRs.
Better po-up was reavailable for DOS help,
but this one may suit your needs if you prefer a program that doesn't take over the

whole screen and doesn't trouble you with anything more than the basics. —Edward Mendelson

DS Help

Design Software's \$29.95 DS Help knows that power users just want to have fun. This memory-resident program has the latest scoops on IBM's DOS 3.3 and pops up with the answers to almost any basic DOS





A screen star is born.

Ultrasync. The high resolution, autosynchronous color monitor that's IBM PC, XT, AT, PS/2 and Apple Macintosh II, SE series compatible.

Ultrasync, with its exceptionally fine (.28mm) dot pitch, creates a picture of incomparable clarity. Capable of displaying infinite shades of brilliant color with striking contrast and dimension.

But the real beauty of Ultrasync is its versatility. It has the greatest autosynchronizing frequency range combination available with 45Hz to 120Hz vertical scan range (NEC's Multisync II starts at 50Hz and peaks out at 80Hz) and 15KHz to 35KHz horizontal scan.

Plug Ultrasync into any IBM PC, XT, AT, PS/2, Apple Macintosh II, SE or practically any computer system and it will adjust automatically to the standard you are using. There's no fiddling with switches or knobs. Our automatic picture sizing feature prevents display distortion and shrinkage. A simple built-in text switch is provided for your convenience. What's more, you'll enjoy the ease and comfort of Ultrasync's ergonomically advanced design.

Nobody but Princeton Graphic Systems could bring you an image with such star quality at a suggested retail price that's remarkably affordable. \$849. After all, we've been doing it all along.





601 Ewing Street, Building A. Princeton, New Jersey 08540 (609) 680-1661 CIRCLE 208 ON READER SERVICE CARD question you're likely to ask. But it also gives you a chance to dress the program up in garish colors and make it dance around the screen

You can move DS Help's window around the screen by popping it up, pressing ScrollLock, and then using the arrow keys. When you've found a convenient place for it, press ScrollLock again, and the program remembers that this is where you want the window to pop up in the future. You can change the color scheme of the menus or select a new hotkey at the same time. The program is smart enough to find itself on-disk and record your changes, so the next time you boot your computer, DS Help automatically pops up in its new position and colors. Most other pop-ups force you to run a separate configuration program before making changes like this. Even when you're in the middle of another program, DS Help lets you alter its colors to suit your mood.

DS Help has its more practical side, too. If you need the syntax that makes XCOPY create subdirectories on the target drive when copying subdirectories from the source drive, just press Alt-H after typing XCOPY on the DOS command line, and this program tells you what you need

to know. You can find the full syntax of every program you're likely to use in your work, plus a helpful introduction to batch files. But the DS Help program doesn't

■ Design Software's DS Help has the latest scoops on IBM's DOS 3.3 and pops up with the answers to almost any basic DOS question you're likely to ask.

pretend to be a full DOS manual on-disk. If you're writing a CONFIG.SYS file and want the syntax for VDISK or DRIVER.SYS, you'll have to crack open the book. But you probably need that kind of help once a year or less.

Unlike many other pop-ups, DS Help understands that you may not know the name of the command you want to use. If you want to add DOS to a blank, formatted disk, pop up DS Help, look under the subject listing for "Prepare disk," and you'll find a brief list of relevant commands. Skim through each description until you find SYS, which is the command you've been looking for.

DS Help is a superb piece of programming. It occupies 46K RAM, pops up over everything, has a clean and intuitive design, and never causes trouble. Unfortunately, the author of the help screens displayed by DS Help seems to know a lot less about DOS than the author of the program code knows about programming. The program gets the basic DOS commands right, but has strange ideas about the more esoteric ones. It doesn't mention that commands like SHARE (which lets network users share the same files) and FCBS (which helps a network manage a lot of files at the same time) are useful only in a network. No matter what DS Help says, don't expect FCBS to "increase the computer's processing speed." And, except on a few AT drives in special circumstances, don't wait for SHARE to warn you that you've changed disks at the wrong moment.

These aren't the only mistakes in DS Help's help screens. The program explains that with the SHELL command (which loads a command processor that may or may not be COMMAND.COM), the P or may not be COMMAND.COM), the P or may not be COMMAND.COM, the P or may not be COMMAND.COM, the P or may not be command processor has been installed. "This is a garbled misreading of a page in the DOS manual that says that the P parameter loads COMMAND.COM permanently into memory If, and only if, a copy of the processor in the Post of the Post of

That (P parameter gives DS Help a DM of trouble: The help screen for COMMAND says that if you load COMMAND says that if you load command processor, the (P parameter Loes) the processor in memory until you enter EXIT. In fact, the (P parameter does exactly the opposite. It provents EXIT in fact, the (P parameter does exactly the opposite. It provents EXIT in fact, the (P parameter does exactly the opposite. It provents EXIT in fact, the (P parameter does exactly the opposite. It provents EXIT is fact, the (P parameter does exactly the opposite and the provents of the p



DS Help lets you reach the XCOPY help screen in three ways: you can press the hothey after typing XCOPY on the DOS command line, scan the subject listing for "Copy files or disks," or choose XCOPY from a list of DOS commands.

The Brain Breakthroug

Announcing: the software package that expands your thinking capacity Truly Easy to Use

In as little as one hour, you can expand your memory-begin to think more clearly-retrieve information superfast-and make intelligent decisions more rapidly than ever before.

That's the promise that we are making-when you accept this challenge: Try the Tornado software package for just 45 days, After then, if you don't say "this is the most important software ever created for your computer ... " you'll get a full cash refund. And the price? As low as \$49.95.

By James Lewis

Are you ready to discover one of the most exciting software developments in years? It's called Tornado-but the name hardly explains

what it can do for you. Tornado is like having a 'photographic memory' that gives you perfect recall of up to 25,000 items of information. And the result is not access to mere facts; you actually boost your thinking power

because you have more "conscious" information. Tornado lets you organize information in new ways-so you can be even more creative, inventive, and productive.

Tomado helps you "memorize" up to 25,000 bits of random facts: letters...orders...notes... plans . . . anything you wish. Tornado is even better than a personal secretary.

You can ask for information and get the answerfaster than a secretary could walk into your office! And you can file information without even deciding on a name for the file folder-because there are none!

Tornado is amazingly easy to learn. You can get started in just 15 minutes

TORNADO Regular Tornado-\$99.95-Full version with all MONEY-BACK GUARANTEE

Tornado-the RANDOM information processor. A software breakthrough that can change the way you work and think.

A Totally New Concept How does Tornado work? Not by megabytes of

software code...not by complex programming languages . . . but by a new principle that is so close to the way you work and think-and so remarkably efficient-that its effect can be astounding.

Tornado mimics three important principles of your beain:

1) In Tornado, you recall information by the contents of the information you are looking for-instead of a file name or key field. (The high-tech term is "content addressable memory," but don't worry, it's super easy to use.) 2) Just as your brain keeps perspective on what's important, so does Tornado-through a simple effective system called a push-down stack. 3) Your brain relates and associates information. And so does Tornado through a unique

superfast search-and-display method. The result: you can finally use your computer in a way that is truly integrated with your work and your life.

Hailed by Experts

Tornado has been reviewed by numerous publications. Patrick Marshall of PC World gave Tornado their highest rating: "Excellent, Excellent, Excellent, Excellent." PC Magazine gave it their prestigious Editor's Choice Award. And BYTE columnist Jerry Pournelle called it "one of the niftiest ... programs I have ever seen." It's rare that a software package gets such universal acclaim. Tomado is one of the most versatile-and most personal software packages ever created. Some people use it for brainstorming. Other people use it for random notes...decision-making...freeform reference information . . . unstructured databases...and much more. "The applications are writes Richard Rothchild. "It is the best written, best documented, most thought out program I own.

Three Versions

Choose the Tornado that's right for you Mini Tornado - \$49.95 - NEW! - Lowest cost version-limited capacity (up to 600 windows and 60,000 characters); does not have: cut & paste. window join, screen grab & put, time & date & sequence stamp, multiple forms, compound

commands and full information capacity (up to 25,000 windows and 2,500,000 characters). Library Tornado-\$149.95- All commands, full capacity, plus a "Library" of windows that will help you organize a year of information at a glance ... plan projects ... make simple business forms...translate time zones, area codes...and much more

All three versions run on the IBM-PC, XT, AT, PS/2, and compatibles in as little as 60K. Tornado runs on floppy and hard disk systems and can run memory resident or as a standard program.

Best of all, Tomado is simple to learn. InfoWorld reports that you can get started in just 15 minutes. You can be an expert in as little as one hour.

Try it for 45 days. No risk. We are so certain that Tornado will become your favorite program that it is offered with this no-risk

Try Tornado for 45 days. Use it. Enjoy it. See how it expands the enjoymen and utility of your computer - far beyond

your expectations. After 45 days, if you do not agree that this is the greatest software in your library, simply return it for a full cash

refund, no questions asked. Could any offer be more fair? Hurry. This no-risk offer may be

We urge you to act at once. This special no-risk

offer may be cancelled without notice. To take advantage of this no-risk 45 day FREE TRIAL, send coupon below-the original or a photocopy-at once. You'll be glad you did.

To order call:

Technical questions & NJ: (201) 342-6518 24 hr. modem: (201) 342-8101 [7,E,1] Fax: (201) 342-0370

	Ш	L	CRO E
		100 2nd S	
Hackensack, N.J. 07602			
٦	YESlac	cent your of	fer. Send n

copy of Tornado-as checked below-under the terms of your no-risk 45 day guarantee. (Tornado is not copy protected.) ____ Mini Tornado \$40.05

Regular Tornado . \$99.95 \$149.95 ____ Library Tornado ☐ 5½" disk ☐ 3½" disk

(Please add \$3.50 to help cover postage and handling. \$10 outside USA & Canada. NJ residents add 6% tax. No purchase orders)

Na	me	
Ad	dress	
Cit	y	
Sta	te	Zip_

Payment: VISA MC CHECK Credit Card Expiration ____

For even faster service, credit card holders may call this number: 800-342-5930.

© 1988 Micro Logic Corp. European marketing by Atlantes Inc. (203) 655-6980. Trademarks: IBM-PC/XT/AT/PS2-IBM

Help Pop-Help

Help Software's \$25 pair of help programs gives you all the basics at a basic price. This is a no-nonsense program with simple, readable screens and reliable data, and it's one of the most inexpensive DOS help programs available. You can even download the programs from a bulletin board and decide whether you want to use them and pay for them. The price is a mere \$15 when you register a downloaded copy. A copy with a disk and a printed manual is only \$10 more. For \$7 you can get a second disk with data files on BASIC and Turbo Pascal

Help and its pop-up companion, Pop-Help, live on the same disk and feed off the same data files, but they work in subtly different ways. Help works from the DOS command line. You can enter the words HELP FORMAT to jump directly to the data on FORMAT, or you can simply enter HELP. The program then presents a window with an alphabetical list of DOS 3.3 commands and lets you scroll to the one you want. Press Enter, and a second window displays clear data about the command

While the data window is on-screen, complete with information on any complicated syntax, you can press C to open a command window and send a command directly through to DOS. You remain in Help after entering the command, and you can scan through the data files for help with other commands. Pop-Help lets you





slightly confusing interface. If you pressed Enter to "execute line" while you were in Pop-Help. nothing would happen until you exited the program.

open the same window and enter a command in the same way, but the command stavs in the window, unrecognized by DOS, until after you exit the help program.

Help gives you lucid data files, but you may find you need to haul out the DOS manual for some details. The program tells you what the optional parameters are for DRIVER, SYS, for example, but it doesn't tell you which values to enter for each parameter. For example, you won't gain much enlightenment by being told to use the parameter "/t:nn" to specify the number of tracks per side on the disk drive you want to control with DRIVER.SYS if you don't know which number to use in place of "nn" for the type of drive you're trying to set up. And Help won't tell you anything about DEBUG.

Yet Help gives full details of all the obscure options of the COPY command and patiently explains why you might want to use APPEND. It also tells you which version of DOS contains each command. If you want to add further details, you can easily customize the data file or simply write your own. Help/Pop-Help is accurate, complete enough for most purposes, and inexpensive enough for all purposes. Unless you expect to make heavy use of a help program, this straightforward program may be all you need .- Edward Mendelson

The Resident Expert

System Just because it's called The Resident Expert System, don't assume it's an expert system-meaning a program that can be taught a method for solving specific problems. Santa Rita Software's pop-up help system offers resident expertise in PC-DOS 3.3 and MS-DOS 3.2 (at \$29 for both on one disk) or in popular programming languages (at \$59 each with DOS help thrown in). You get a pop-up shell and a data file for DOS or a programming language, and you can add other data files later. A \$39 compiler lets you convert your own text files into data files, so the range

of your computer's resident expertise is The Resident Expert System also gives you many ways to find your data, not all of them equally intuitive or efficient. When

potentially unlimited.

Manage the forest with the Trees.

Finding your way through files and directories is like being lost in the Great North Woods. Unless you have the Trees to guide you: XTree and XTreePro disk management software.

X Tree became a leading PC utility by making disk management easy. Even for novice users. XTree graphically displays the file directory structure; it's like a road map of the disk. You can move, copy, delete, rename, print and find files across directories with a single keystroke. Even reorganize an entire disk in just minutes.

XTreePro adds power, speed, and new productivity features to XTree's elegant simplicity. So you can stimultaneously work with files on more than one drive. Prevent accidental deletions of protected files. Edit files and execute programs from within X TreePro. Even re-execute a DOS command without retyping—just point, edit and go.
XTreePro lets every user manage a disk like a professional.

Look for X Tree and X TreePro in dramatic new packaging at most leading computer and software dealers. If you're already using X Tree or another disk management program,

call (800) 634-5545 (in California:

800-551-5353) for details on our generous XTreePro trade-up offer. And join more than half a million PC users who are

managing the forest. With the Trees.



The world leader in disk management.

4330 Santa Fe Road, San Luis Obispo, CA 93401. Telephone (805) 541,0604



y Benjanin Frankiin

to write them for you.

have ever had a Pleasure in obtaining ncestors. You may remember the Enquirie delations when you were with me in Engla that purpose.

Now imagining it may be equally agreable XCOPY [d::[path]filename of my Life, many of which you are yet un ocks uninterrupted Leisure in my presen

To which I have besides now other labor
Forerly 3 Obscaring in which I was the Common Burger of Reputation in the World,
This common Surper of Reputation in the World,
This common Surper of Reputation is the World,
This common surper of the Common Surper of Files
Los Loss, as they any find more than the Common Surper of th

RESIDENT EXPERT (tm)-PC-DOS Version 3.3 PREU ENTR SPREMENTS

[d:][pathi[fiienamei [/Ai[/D:datei[/Ei[/Mi [/Pi[/Si[/Vi[/Vi

Dog 1 Pe 1 Ln 14

The DOS help screens in The Resident Expert System include a lot of unhelpful headings like "Synopsis" and "Overview." The E on the left edge of the window and the M on the right edge tell you the positions of the data for this command in the full database.

you press the hotkey, the help screen pops up, prepared to offer information on the word under the cursor, whether you're at the DOS prompt or in the text editor. Unlike other pop-up help programs, The Resident Expert System lets you move the cursor to any point on your original DOS or application screen while it displays

help, so you can point and shoot for information on any word or command you choose. If the word you pick isn't in the data file, you get the slightly puzzling message, "Term not in this context,"

All this is relatively simple and technically ingenious. But when you switch to the other lookup methods available in the program, you get tangled in minor annovances. If you want to consult a general index of topics and commands, you can't use the cursor keys to reach the appropriate menu option because the cursor keys move the cursor for the point-and-shoot lookup on your original screen. Instead you press the appropriate letter key or use the Spacebar or Tab key to move between options. When you finally reach an alphabetical index of commands and topics, you can again use the cursor keys-but now you can't use the letter keys.

The data included in The Resident Expert System's DOS data file is accurate but not extensive: it omits many commands from CONFIG.SYS. There's nothing about VDISK, nor about the tricky syntax of DRIVER.SYS-although MS-DOS's near-equivalent DRIVPARM is docu-

mented in full. The pop-up window is too small to display more than a dozen narrow lines of text, so you may be forced to page through four or five screens before you find what you need. But you can keep the help screen visible when you exit-a useful feature when you want to type the complex syntax for which you consulted the program in the first place

Some impressive technical expertise went into the design of the pop-up shell. despite its inconveniences. It sails with aplomb through virtually any configuration of programs and TSRs you may have in RAM, and it contains options for handling any especially weird condition. Also, the pop-up screen has a special feature that looks fancy but otherwise seems to have no discernible value: two position indicators, one on either side of the screen. the first offering an idea of how deep you are in the group of screens devoted to an individual topic, the other indicating the position of the topic itself in the complete help file. This may be useful if you forget that APPEND is near the beginning of the alphabet and XCOPY near the end.

-Edward Mendelson

POP-UP HELP FOR LOTUS 1-2-3

Boston Doc for Lotus 1-2-3

On-line help for a difficult software application is a terrific idea, at least conceptually. This is obviously what Boston Documentation Design had in mind when it produced Boston Doc for Lotus 1-2-3. But how well a good idea is executed makes the difference between winners and losers. and in Boston Doc's case, the execution is poor.

Boston Doc can be run from the foreground (that is, as a straight program) or it can be operated in the background. This is where the trouble starts. Since it's a reference manual for 1-2-3, you'll want to run it in the background with 1-2-3 in the foreground, but to do this you first have to load Switch-It, a memory-partitioning utility. Switch-It blocks off about 124K of RAM



DOS 2.1 or later In Short: Accurate but not extensive DOS belo in a cramped screen, with too much complexity for the expertise provided. Not copy protected.

MUTCH

The Fastest Draw in the West is From the East.

Holt it right there, partner. If you're after the quickest draw in these parts, then track down the new Mutoh pencel plotters.

They're lightning fast—we're talkin' 5.7G acceleration and 44ips for the F-Series. With a quick-loading cartridge that holds 40 leads to blaze away longer without having to stop and reload.

What's more, pencil is clean and sharp. You can erase and redraw parts by hand easier than a rustler covers up horse tracks, only a darn sight prettier. So you get copies slick as a whistle.

When it comes to plotting, show on you mean business. Get the good guys from Mutoh on your side.

We're Giving You a Whole New Line.



NEW PRODUCT

The F-910A plotter take either pen or pencil Resolution of 0.0004*. Speed of up to 44.5ps. Accelerates up to 5.7G.

Accelerates up to 5.7G. Pen/Vector Sorting Function HP-GL compatible.

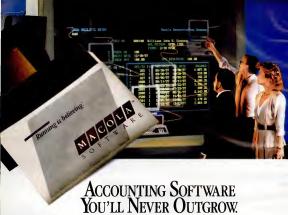
MUTCH AMERICA INC.

895 Cambridge Drive, Elk Grove Village, IL 60007 Tel 312/952-8880, Fax 312/952-8808 Western Office: 4883 East La Palma Avenue, Suite 505, Anaheim CA 92807 U.S.A. Tel 714/779-2326

MUTOH INDUSTRIES LTD.



CIRCLE 373 ON READER SERVICE CARD



Business managers now are projecting their accounting software needs well into the future. That's smart. The software you choose must meet the demands of your evolving business and provide management information to help fuel growth.



In the words of PC Magazine, Macola Accounting Software "is at the top of its class ... a flexible, powerful system that is well suited to many different businesses."

13 Integrated Modules Accounting General Ledger-Accounts

Receivable-Accounts Payable-Payroll-Assets/Depreciation

Distribution Inventory Management -Customer Order Processing-Purchase Order and Receiving

Call for availability. IBM, PS/2, OS/2 are regis trademarks of IBM. Micro Focus is a registered mark of Micro Focus Corn. PC Magazine is a publication of Ziff Davis Communications Co. scola is a revisiered trademark of Macola. Inc. Manufacturing Bill of Material Processor-Material Requirements Planning-Master Scheduling-Shop Floor Control -- lob Costing*

Plus there's a Report Writer that allows customized reporting and can easily transport data files to popular spread sheet, word processing and data base programs.

Proven Network Compatibility.

Macola Software reflects 15 years of maturity in mini and micro LAN environments. No other software can say the same. So when your business is ready to add more workstations, your software is ready as well. With no limitations

Speed and Data Integrity, Macola Software is written in Micro Focus COBOL for maximum speed and data integrity (source code available.) IBM has licensed Micro Focus COBOL as its SAA standard for the new PS/2 and OS/2 Comprehensive Support. PC Magazine also determined "Macola's technical support, documentation and customization assistance meet the high standards set by the software."

Running Is Believing. Your choice of Macola Software is a one-time solution for the life of your business. For detailed information, "live" demonstration modules and an authorized reseller in your area, call today:

1-800-468-0834 (USA) 1-800-468-0833 (Ohio)

P.O. Box 485 Marion, OH 43302

(614) 382-5999 Powerful accounting for

successful companies.



Boston Doc for Lotus 1-2-3 operates as a system of windows. The information presented is very good, but as the layers pile up on-screen, they become difficult to read. In this example, the Variance function is defined and an example is given. Two other windows are visible below.

and then lets you get to it by pressing the Alt and 1 keys simultaneouly. You then load Roston Doc into this partition and switch back to the foreground, again with Alt-1, to load 1-2-3. Are you still with me?

There is a tutorial for 1-2-3, but it is inadequate because it doesn't go into much depth and makes no mention of macros.



And, boy, is it annoying to use! To actually use the tutorial, you have to switch back and forth between the background and foreground (Alt-1 again-not the combination I'd choose). The tutorial will tell you to put four different labels in cells B2 through E2 and numbers in B3 through E3. When I switched back to 1-2-3, I couldn't remember what to put where. I found it was easier to write the information on a piece of paper and then switch to 1-2-3 to enter the labels and numbers than it was to switch back and forth. To make this an effective tutorial. Boston Documentation Design has to find a way to put Boston Doc for Lotus 1-2-3 on top of 1-2-3, so you can read the instructions while you're working on a spreadsheet

Other than the tutorial, the quality of the on-line documentation is good. It's just tough to get to. There is a lot of detail about many subjects, including macros, and all of the subjects are cross-referenced. But to get to the cross-references, Boston Doc pops windows on top of windows, making the screen hard to read, it starts out fine, with a reading window popped on top of the table of contents. F2 takes you back to

the table of contents, which you can re-sort by title. So far, so good, but when you get down to the detail and then the cross-reference, you could have up to four windows displayed on top of one another. But the worst part is that 1-2-3 isn't at the bottom of the whole mess-it's back in the foreground.

Boston Doc for Lotus 1-2-3 is well written and has solid documentation for 1-2-3. it's just a pain in the neck to use. The tutorial is worthless, you can't change the hotkeys, and searching through the windows is confusing. On-line help for 1-2-3 is a great idea, but I found that it was easier to invoke 1-2-3's F1 help key and search for an answer than it was to use Boston Doc for Lotus 1-2-3.--Christopher Barr

1-2-3 OuickRef

Imagine this: you just get back from the Lotus 1-2-3 seminar, you sit down at your computer with a newly installed copy of 1-2-3, and your brain turns to mush. Were you supposed to plug those numbers in with the @PV or the @NPV function? It's for times like these that you'll want 1-2-3 QuickRef, a RAM-resident help program for Lotus 1-2-3. Release 2.01. Press the eray Minus key, and a colorful help screen is displayed on top of your 1-2-3 worksheet. Scroll through the commands until you find @PV, and an explanation jumps out at you.



CIPCLE 406 ON PEADER SETIMOS CAVE



Though incomplete, the interactive, memory-resident tutorial of 1-2-3- QuickRef is one of the program's best features. While the inscruable entry for cell B8 appears at the top of the screen, a window describes what is going on and prompts you with the next step.

The \$99.95 program comes from | American Training International, the folks that produce a number of tutorials for major PC software applications. It's easy to install, and it remains RAM resident until you need it. It uses only 84K RAM, but unfortunately there is no way to recover that memory if you need it unless you reboot your computer. The quality of the help is good, but a number of important topics are not even mentioned. Formulas and all of the @ functions are covered in detail, as are most of the slash commands. but there is no coverage of macros, data management, or graphing. And for \$99.95 they should be included.

When you press the gray Minus key, a small red menu pops onto your screen near cell B1. By using the arrow keys you scroll through the list of topics, and when you stop scrolling, the topic that you highlighted will pop onto your screen in a larger red box in the middle of your screen. When you press Esc both boxes disappear.

With 1-2-3. Release 2. Lotus stepped making an interactive disk-based tutorial. Now 1-2-3 QuickRef remedies that with a fine interactive tutorial that is also memory. resident. The tutorial is presented in a clear manner, and you can pick and choose the subjects you want to learn. But it, too, suffers from the same shortcomings as the online documentation does because it lacks instructions for macros, the database, and graphics.

The program performed well with other RAM-resident neighbors, including Side-Kirk, Right now 1-2-3 QuickRef is a dependable neference product and much earlier to use than 1-2-3's own on-line help. But it would be improved considerably if ATI were to add in the remainder of the documentation for 1-2-3. — Christopher Barr

Sherpa for 1-2-3

Sherpa for 1-2-3 is an easy-to-use but limited companion program to Lotus 1-2-3. It helps beginners and infrequent users of 1-2-3 take advantage of a variety of advantage of a variety of advanced 1-2-3 features without having to learn or remember the semerimes complex sequence of steps necessary to execute parts.

ticular features.

Sherpa can be installed on a hard disk

or used with a floppy disk system. However, if you are using a floppy disk system, you must first make sure there is about ZK of free memory available: on your 1-2-3 system disk. Since there is no remaining space on the system disk for the latest version of 1-2-3, you will need to transfer one or more fless to another disk prior to installing Sherza.

By following normal installation procedures for Sherpa, you eliminate dietect access to the 1-2-3 Help system. There is an alternative install routine that will allow easier access to both Sherpa and the 1-2-3 Help system, but you will need to spend about 5 minutes on installation each time you use the system.

Ling Sherpis is quick and casy. At any ocu and hit the FI key and a 2-2 spreadboat, any ocu and hit the FI key and a 2-2 spreadboat or quantity and the FI key and surface will also pear with the following choices: create a bar graph, copy row/column, delefied a record, format cells, functions (sum, avg. and so one), insert outdouburn, move a cell or cells, record a macro, print the proposed proposed process of column width, sort data spreadboat, set column width, sort data for the following the column width or the following the fo

Next, you are taken through a number of prompts to enter your selection. Unfortunately, in many cases, you use the same number of keystrokes—or more, in some cases—than you would using 1-2-3 with-



BERNOULLI CONTINUES TO BRIDGE THE GENERATION GAP.



As now generations of computers take their place alongside, year old neithbles, incompatibility can become a problem. Utless, of course, you've using beroundil Technology Permotall "14 to you enchange data and applications between INS2" Micro Channel" computers and PCs of all kinds—inchaining today's dest host machines. Permotall Bears' and IOMB and 2008 mornoble block Cartrigies are wealiable in INV and 3" sizes, and in internal and external models. So get never-ending compatibility and never-ending storage data and the control of the Cont

'n Uten cell 1-900-920-30th Bernoulli Sechnology is also Apple® Macrisonh® competible PS/S and Micro Chemnel are tradema

CIRCLE 378 ON READER SERVICE CARD

Never ending storage

Perfect running

It's no contest. Funk's 1-2-38 performance software helps improve your 1-2-3 productivity better than any other software you could possibly track down.

That's because each one is in perfect step with 1.2-3. With menus and commands like 1-2-3 itself. And with





Sideways* has always been the one software to turn to for printing spreadsheets that are

too wide for your printer. It turns text on its side as it prints. So no matter how many columns you put in your spreadsheet, you get them all back out in one continuous printout. Without staples, glue or tape.

Create presentationquality printouts that look just the way you want them to. Highlight ranges with bold, underlined, and expanded type. Choose from nine different type sizes, from minuscule to mammoth, Print through orskip over perforations. Add borders, change page size, adjust margins any way you like.

You can run Sideways right from your 1-2-3 or Symphony menu. Just highlight a range and

Plus. Sideways is the right way to print with all your other software, too. Including databases, word processors, project planners, even other spreadsheets. And it prints with all popular dot-matrix printers, as well as the Laser Jet Plus Series II.



12 5 1 map 12 160 1 2

A Cloude in 1984

(2 5 10x35 · 0 139 t

SETMENT IN THE SET

1 \$ 1max 12 '90 t

1 1 1 12000 12 100 1

it fines in its

115 loop 12 160g

1 5 1 mage (# 195)

HER THE IS NOT A

14 2 tease 18 182 t BELLEVE IS THE

14 F Imam 10 170 r

1 6 5 tomos on 1984

14 5 'mass 18 150 p

1 F F 1 (1940) 5 1 (1941)

I E E 'BRE IN IS'

LESS OF THE LESS OF

CHINNE IN THE

"Sideways is such a fundamental improvement in spreadsheet printing that I find it hard to imagine using 1-2-3 without it. PC MAGAZINE

InWord.

Full-function word processing that runs inside 1-2-3.



If you need to create letters, memos, or reports that include data from your spreadsheet, you need

InWord is just a keystroke away from 1-2-3. So you don't have to jump through hoops to put spreadsheet data into a document,

Create live links to data in your spreadsheet. When you change the spreadsheet, the changes appear in the document automatically.

And Inword's powerful formatting features rival the best stand-alone word processors. InWord fully supports the capabilities of your printer, whether it's a 9-pin dot-matrix or an HP LaserJet. You can mix pitch and typefaces freely, and even print in proportional type with full micro-spaced justification for the ultimate in print quality. "Of all the 1-2-3 word processing

add-ins. InWord is the cleanest. fastest, easiest to use. "PC MAGAZINE



partners for 1-2-3.

powerful functions and features that take up right where 1-2-3 leaves off.

So don't wait. Dash out to your favorite software store and ask for them by name. Or order directly from Funk Software.

The Worksheet Utilities. It brings out the

power user in anyone. The Worksheet

Utilities"is a collection of powerful tools that will change the way you work with 1-2-3. File Manager is a power-

ful disk organizer that lets you describe, catalog, archive, copy, move, erase, rename, and compress worksheets and other files. all from within 1-2-3.

Print Settings lets you see all your print settings on a single screen, create different print settings for different jobs, and select print styles like "17 pitch" and "landscape mode" from a menu customized

for your printer Formula Editor provides a powerful environ-

ment for entering, editing, and debugging formulas, with point/shoot menus for @functions, prompting for arguments, and an on-line @function reference

Search and Replace lets you hunt through your spreadsheet for labels, values,

@functions, and cell references - and optionally replace them. AutoSave creates periodic back-ups of work-in-progress, to guard against power

failures and editing mistakes. "Indispensable...a stunning set of utilities...the

Formula Editor is simply beyond belief." PC WEEK Sideways is a registered trademark and The Worksheet Utilities, In Word and Noteworthy are trademarks of Funk Software, Inc. © 1988 Funk Software, Inc. Noteworthy.

The software that remembers. So you don't have to.

Noteworthy" is the professional cellannotation and documentation software that lets voutell the story behind the numbers, formulas and macros in your spreadsheet. Want to remember

why you put what you put in a cell? Just press the hot-key and up pops a blank note. Then type

away using Noteworthy's powerful built-in editor. Make as many notes as you need, each one up to 8000 characters long. Copy text from a note to a spreadsheet. From a spreadsheet to a note. Or from one note to another.

It even reminds you where you put your notes. As you move through your spreadsheet, an indicator lights up whenever you land on a cell containing a note.

"The simplest, most effective, and the most custon izable way to attach notes to spreadsheets."



Sideways \$69.95 The Worksheet Utilities \$99.95 equires 1-2-3 Release 2 InWord \$99.95 quires 1-2-3 Release 2 Noteworthy\$79.95

use your spreadsheets need ever forget the

true meaning of a cell

To order call: 1-800-822-3865 ext. 115

runk Software, 222 Third Street, Cambridge, MA 02142 CIRCLE 323 ON READER SERVICE CARD



Sherpa for 1-2-3 offers step-by-step guidance through the execution of a variety of Lotus 1-2-3 features. Finding the maximum value in a range of cells, for example, is accomplished quickly and easily by following Sherpa's easy-to-understand prompts.

out Sherpa. For example, formatting a cell with Sherpa requires seven keystrokes, while the same process following only 1-2-3 menus requires six. The usefulness of Sherpa with very basic 1-2-3 functions such as this one is dubious, although a beginner may appreciate the additional explanation that accompanies the Sherpa prompts.

The Functions option has a bit more to offer. Selecting this option produces a menu of 16 commonly used functions (e.g., average, count, sum, standard deviation, lookup, and so on) with a two- or three-word description. You are then prompted for your specific conditions, which Sherpa converts into 1-2-3 format and then executes as a command. Error messages are displayed if you enter inappropriate data. The Functions option is helpful not only to beginners but also to infrequent users who may not remember the formats needed to execute these functions.

Beginners and infrequent 1-2-3 users would probably benefit from the clear and easy-to-follow prompts provided by this package, and perhaps they would be able to take better advantage of some of the more-advanced 1-2-3 features. However, since Sherpa does not generally increase the speed with which 1-2-3 features are executed, more-seasoned 1-2-3 users will not find this package necessary.

-Marianne L. Myers

POP-UP HELP FOR

OTHER APPLICATIONS

Diamond Tips V2

Diamond Tips V2 is the closest thing you can find to an all-purpose help program. It isn't content merely to tell you about DOS 3.3 and give you an ASCII table. It also helps you with WordPerfect, MultiMate, Lotus 1-2-3, and Symphony-with dBASE III thrown in for good measure. You probably don't have all these programs on your disk, but if you do, this \$69.99 nackage from Diamond Touch Corp. lets you use the same set of keystrokes to get help with

Diamond Tins coexists nicely with every application I tried. Its hotkey is the combination of Alt and the two shift keys, which won't conflict with the keyboard assignments of any standard program. That's important, because you can't redefine the hotkey or use the program as a standalone. And it's a hotkey that you won't press accidentally.

Whether you'll press it deliberately is another question. The help screens in Diamond Tips V2 cover a lot of territory, but they bewilder as often as they illuminate. Some keys are defined by function, without any hint of which key you are supposed to press to use that function. The explanation of dBASE ".CAT" files reads: "Contains selected groups of files that you like to work with solely. Set catalog to phone." The WordPerfect help screen explains the hard hyphen under the heading "Require [sic] hyphen," and explains it as "Put in hyphen in several words." The example of a 1-2-3 database-extraction macro includes these steps: "Then it will ask you to enter criterion range, which is D2..D3, where John must be entered earlier to be your matching criterion. Now it will ask you to enter output range, then you just out the cursor on D6 where the field names Name Phone Add were entered earlier and hit return. Then the record of John will be extracted out there." All of this appears in hard-to-read capital letters

The DOS help you get from Diamond Tips V2 tends to tell you what you already know. If you weren't aware that FCB stands for File Control Block, the three lines on the FCBS command won't en-





one disk drive. DOS 2.0 or later In Short: Homely-looking and moderately informative beln screens about DOS and a lot of other things. Not copy protected. FICLE 663 ON FEADER SE

any of them

ERASE. ARE YOU SURE?

Levery computer user faces this question in some form each day. The rase or not to erase. The seve or not to seve, when saving mean overwriting the previous version of a file. If you answer yes and you're wrong, countless hours of work will be wiped out by a single keysfel. And there won't be anything you can do about it, unless you're backed un.

Disk failure, theft, power surges—any of these can sneak up on you when you least expect. It. However you look at it, backing up important files is essential. And nothing will make a believer out of you like finding out, just once, that you weren't as sure as you thought.

MaynStream: A Sure Thing.

MaynStream is a file-by-file backup system that procial tape and restoring it from the tape to any drive you specify, on command. With MaynStream, backup is a breeze. You'll see all the options you need right on the screen. In seconds, you can easily customize the backup process to work the way that's best for you.

Backup Is Just The Beginning.

MaynStream's pull-down menus make it remarkably easy to back up, restore, assign names to frequently backed-up groups of files, select optional password protection, and more! And context-sensitive, on-screen help is just a keystroke away.

and, because MaynStream is completely portable and compatible with all PC and PS/2 systems, you can use a single MaynStream to back up all the personal computers in your office—whether you have a classic PC or compatible, or a PS/2 Model 55,00, or 80! Plus, MaynStream is Novell-approved, and works with all popular IANs including Novell, and SOOM, and IBM's PC Net.



The Inside Track

MaynStream is also offered for internal installation in the PC or compatible, and in the PS/2 Models 60 and 80. Plus, it comes with a number of faceplates designed to match today's most popular computers. MaynStream, from Maynard Electronics. Backed by our 1-year warranty and Technical Support Team. In these uncertain times, it's one thing you can be sure.

MAYNSTREAM. YES I'M SIIRFI



taymStream is available in 20, 60, and 150MB cassette or cartridge models and reign language versions.

Call us today for the name of your nearest authorized dealer or more information on today's leading tape backup system.

Maynard Electronics
We're backing you one-hundred percent.

We have one thing to say to the people who keep getting personal about PROCOMM PLUS,

"Right now, PROCOMM PLUS is the definitive telecom program and the one I personally use and recommend." John C. Dyorak.

columnist, PC Magazine

People who review software have a very tough job. They see hundreds of new programs every week. But the ones who have seen the new PROCOMM PLUS communications software are doing more than writing rave reviews about it. They're getting personal. They're using it at work and at home.

Maybe it's because PROCOMM PLUS is so easy to use its "intuitive". Or perhaps it's because PROCOMM PLUS has an adversely powerful script command language, cortied sensitive help, it is eminot emulations with leyboard re-mapping, 12 file transfer protocos, a fully-outmorted dialing directory, and advanced host mode with electronic mail.

But one thing is for certain. If PROCOMM PLUS is the personal choice of the people who review software, you can be sure that PROCOMM PLUS is fight for you.

It's time you got personal about PROCOMM PLUS. Ask for PROCOMM PLUS at a dealer near you. Or, call 314-474-8461.

Thank You.



■ POP-UP HELP



Does this screen from Diamond Tips V2 really help you understand APPEND's IX parameter? And what does APPEND have to do with MultiMate? As you can see from the menu on the top line, you reach this program's DOS help files by pressing the letter O.

lighten you. The program offers sample syntax for many DOS commands, but doesn't always tell you the default. The explanation of the 'C parameter of COM-MAND reads: "Passing a string & go back to primary command processor." Thouse doesn't tell you that the string should be a command, and it doesn't suggest why you might want to do such a thing. (if sueful for nesting batch files or running DOS commands from within an apocification.)

The menu in Diamond Tips is almost as strange as its diction. You access DOS help by pressing the letter O (for ODOS), the letter D having been preempted by dBASE. The DOS help screens consist of an alphabetical list of commands with a brief syntax summary for each. This list fills 20 screens. (Lotus 1-2-3 and Symphony get 41 screens, dBASE gets 53, and the word-processing programs get fewer than 20.) You can't jump directly to information on any command. Instead you must scroii through each screen or press F1 to see an index, where you have to figure out the position of the command you want in entries like "GRAFTABL to MKDIR 08." You can then type in a number, but

don't forget to type 08 rather than 8.

The PgUp and PgDn keys let you move one screen at a time through the help files. When you reach the end, the program beeps and flashes the message, "Last screen already." If you press the Home

■ In Diamond Tips V2,

help screens consist

of an alphabetical list of commands with a brief syntax summary for each.

key, the program reads the disk but doesn't change anything on-screen. The End key doesn't take you to the end of the help screens, but drops you back to the menu. Up and down arrow keys have no scrolling effect, so you often have to jump back and forth between screens just to read a single sentence.

With Modems you can Get Smart ...or Get Smarter





- hardware error correction procedures to guaranty 100% error-free data.
- DEPENDABLE . . Built by the manufacturer of the world famous EGAWONDER graphics cards, the 2400etc has full compatibility with popular communication software.
- SMART . . Every modem includes a FREE copy of Mirror II communications software which allows users background tasking for receiving Electronic Mail or Data transfers concurrently

art price to pay for Smart technology AVAILABLE FROM LEADING COMPUTER DEALERS

ATI Technologies Inc., 3761 Victoria Park Ave. Scarberough, Ostaria, Canada M 1W 352
Tel: (416) 756 0711, Tta- 06 966640 (ATI T0R) Faz: (416) 756 0720

There's some surprising information hidden away in Diamond Tips V2. The explanation for WordPerfect's Print Mode key begins with the line "Lets people change." The next line makes clear that this means you can change pitch and justification, but for a moment it looks as if WordPerfect has psychological powers that not even its authors could imagine. -Edward Mendelson

KevNotes/Associated Press Stylebook

Slide a press pass into the hatband of your battered fedora, install the KeyNotes/Associated Press Stylebook on your computer, and sit down to write like a hard-boiled reporter. Or not quite like a hard-boiled reporter, because the AP Stylebook is packed with rules and regulations for punctuation. word choice, and everything else relating

to the proprieties of the written word. Digital Learning Systems' \$49.95 popup English teacher even knows the rules of sport and business. Work your way down





Version 1.0 Digital Learnin 4 Century Dr. Parsippany, NJ 07054

(201) 538-6640 List Price: \$49.95 Requires: 128K RAM (m sk drives, DOS 2.0 or later In Short: Lots of valuable information on writing style, but effectively hidden by inconvenient program design. Not copy protected

CIRCLE MIZ ON READER SERVICE CAR

the menus to rabbit punch, and the program explains it as, "A punch behind an opponent's neck. It is illegal." But it won't tell you all you need to know about computer terms, despite its extensive vocabulary. Ask it about assembler, for example, and it explains: "A type of program. Do not use assembler program,

which is redundant." You don't get much more help from the design of the program. Let's imagine that your deadline is 5 minutes away, and you're afraid of getting scooped by your archrival, that mild-mannered reporter from the Daily Planet. You need advice fast on the proper use of the term SALT Talks. You pop up the main menu and press S to start a search. But you forgot that the KeyNotes/AP Stylebook uses 65 separate files to store its data. You begin waiting while the program begins scanning all those files, and finally you decide you need quicker action.

Ideal Working Condition



If you're looking for a highspeed laser printer that can easily handle as much as 25,000 pages a month, the new Toshiba PageLaser12[®] is the machine for you.

It thrives in any high-volume office environment. Whether it consists of a productive single user, or a network of multiple users sharing the workload.

PageLaser12's extended product life might help explain its hard-work mentality. At up to 1.2 million pages, it's three times more durable than other laser printers. And better still, at 12 pages

per minute, PageLaser12 is up to 50% faster than many other laser printers.

You'll also have an equal appreciation for its advanced paper handling options. Like its fullyintegrated automatic envelope feeder. This

option lets you print large quantities of envelopes—up to 100 at a time-without constantly

banging away on your office typewriter.

So you press Esc to get back to the menu, and then you descend one menu level to an alphabetical list of each file. You bang on the PgDn key until you reach the heading that includes sa to sc. You press Enter and then scroll down through another alphabetical list until you reach SALT. You press Enter, and see a screen with the words "See Strategic Arms Limitation Talks (Treaty)." So you press Esc to get back to the menu and S to search for strategic. The program immediately displays the same screen you just saw, and when you try again it reports it can't find the word. That's because if you're in one of the data files, the program can search only within that file. To search through the entire database you must be at one of the top menus. So you go up one more menu level, find the file for st to sy, and page through until you find strategic. By this time the Daily Planet has already hit the



• DOS Help! • Sherpa for 1-2-3

Accurate and reliable pop-up help is hard to find. Though many programs have useful individual features, comprehensive packages are few. At their best, pop-up help programs need to meet the needs of both new and experienced users.

new and experience users.
Flambeaux Software's DOS
Help! offers exactly what the name
says—full, flexible, and accurate
DOS help. It's easy to use as a popup or standalone and more complete than the DOS reference manual, DOS Help! vives you in-depth

advice and real-world warnings you'll never get from Microsoft or IBM. It's the one help program to own if you're already a DOS expert—or want to become one.

No program could ever fully document the hundreds of complex functions of that ubiquitous program, Louus 1-2-3. Sheepa for 1-2-3 mounts an assault on the summit of 1-2-3 proficiency by serving as an excellent step-by-step guide. Special mention goes to 1-2-3 QuickRef for its strong, on-line tutorion.



What's more, our dual-bin paper feeder, combined with PageLaser 12's standard cassette feeder, provides a paper capacity of 750 sheets.

So now, with a total of three paper feeders, you can print letter and legal sizes, or even labels and envelones, automatically.

As for multiple emulations, HP LaserJet 500 Plus, Diablo, IBM Graphics, Qume and Toshiba P351 all come standard, as do parallel/ on high volume, get the laser printer that does the same. The PageLaser12. For a PageLaser12 demonstration, call 1-800-4577777 for the name of the Toshiba printer

serial interfaces. So if your business prospers

and computer dealer nearest you.

Then see how well PageLaser12 performs in your

surroundings.

TOSHIBA
Tobba Aperica, Inc. Information Systems Devision

IBM is a registered trademark of International Business Machines Corporation, Diablo is a registered trademark of Xerox Corporation, Qume is a registered trademark of Qume Corporation, LaserJet 500 Plus is a registered trademark of Hewlett-Packard.

A lot of computer for your money



INCREDIBLE SYSTEMS PRICE REDUCTION!



Bentlev-286/12

Base System . 12MHz 80286 processor, 1MB RAM, 1.2MB floppy drive,

dual floppy/hard drive controller, 200-watt power supply, and keyboard.

 With 40MB HD Seagate, 30ms\$1545 With 70MB HD MiniScribe, 28ms\$1815

Bentley-286/10

Base System. 10MHz 80286 processor, 512KB RAM, 1.2MB floppy drive, dual floopy/hard drive controller, 200-watt power supply, and

keyboard. • With 40MB HD Seagate, 30ms With 70MB HD MiniScribe, 28ms\$1699

Bentley Computers ... The Price/Performance Leaders!

Monographics Card Text mode: 80 col x 25



EGA Card 640 x 350, 256KB EGA Monitor 14" tube, 13" dis day RAM ... EGA card and monitor...... \$469

Color Monit

\$239

ech C7 MS But Mouse\$119 ilus GM-6+

Modems-All Ber

dems are compatible with ards and have auto er, auto redial, and a voice/data switching. Exter-nal modems include LED modem cable for hookup.

More memory, more power ...

XT-MFC-A six-fur nsion card: 384KB RAM, serial port, parallel

et, game port, clock-dendar with battery ackup, and utility softw

MEM-576-Memory expan-sion card that fits in a short

Microsoft memory specific slot and supports either 64KB or 256KB chips. tion. Comes with 0KB, ex Comes with OKB, e dable to 192KB, 284KB or

Only . Orchid Tlny Turbo-

90286 pr your PC. 8087-3 (5MHz) ... 8087-2 (8MHz) Only 80287-6 (6MHz) . . 80287-8 (8MHz) . .

80287-JD (JOMHz) \$3 AT I/O-Serial port and PC I/O-Serial port. Only\$59

parallel port, game port and clock-calendar with ittery backup. Only\$65

AT-MFC-for IBM PC ATS AT-MPC-tor a..... Up to 1.5MB memory ex-

pansion, serial & parall port. Comes with 0KB

ecification card co

with the Lotus/

ndable to 2MB. In

\$119

... plus a one-year warranty!



INCREDIBLE SYSTEMS PRICE REDUCTION!



Bentley-286/8

Base System 8MHz 80286 processor, 512KB RAM, 1.2MB floppy drive,

dual floopy/hard drive controller, 200-watt power supply, and keyboard. • With 20MB HD Seagate, 65ms \$1095

• With 40MB HD Seagate, 30ms\$1295

Bentley Turbo-10

Base System ... Turbo-charged XT-compatible 8088 processor running at

10MHz, 640KB RAM, one 360KB floppy drive and controller, eight expansion slots, 150-watt power supply, and keyboard. With 30MB HD MiniScribe, 65ms.....

Enhance your Bentley-286 with our popular AT add-on products!

Hard Disk Drives

High Quality • High Storage Capacity Low Price • High Performance

One-Year Limited Warranty

For Your Bentley-286

40MB Seagate (30ms).... 43MB MiniScribe (25ms). 70MBMiniScribe (28ms)





\$389 For the AT For the PC



Computer Products

bject to change without notice. One-year limit

: Mon.- Pri. 8 a.m.- 9 p.m.

Sat. 9 a.m.- 5 p.m. - Fri. 9 a.m.- 5 p.m. Order Toll Free

Tech Support; 512-250-8202



sality 30MB and 40MB hard disk kits for the IBM PC and

\$339 30MB MiniScribe (65ms) 40MB MiniScribe (61)

360KB Diskette Drives Convenience and compatibility For PCs \$99 For ATs\$109

CIRCLE 275 ON READER SERVICE CARD



Hereby, too, I shall indulge the Inclination so natural in old Men, to If this magazine followed the guidelines in the KeyNotes/Associated Press Stylebook, it wouldn't exist at all. When you run the search function from the top-level menus, the program takes a long

time to find the desired string. But when you run it from a low-level menu, it searches only in a limited group of files and may not find the reference at all. I have ever had a Picasure in obtaining any little Amendotes of my neestors. You may remember the Empiries I made among the Remains of my elations when you were with an in Employ! al, all distinctions wermor, lieutenant dge, federal ach a Repetition is not to be expected, the Thing most like living one's

Hereby, too, I shall indulge the Inclination so natural in old Men, to KeyNotes Writer's Handbook contains a mine of miscellaneous information. Press Enter at this point, and you'll be reminded to address your dentist as Barbara Smith, D.D.S., when you write to the office, and as Dr. Barbara Smith when you write to her home. You should probably follow this advice if you prefer your dentistry to be painless.

life over again, seems to be a Recollection of that Life; and to make

hat Recollection as durable as possible, the putting it down in Writing.

This gets you rattled, and you realize you've forgotten how to use an apostrophe in possessive nouns. So you pop up the stylebook, choose "A guide to punctuation" from the main menu, then select the alphabetical file "ampersand-hyphen" from the sub-menu, then "apostrophe" from the next menu. This brings up a screen that says only "Follow these guidelines" and absolutely nothing else. So you go back to the menu, where you find the subhead "possessives" a few lines below "apostrophe." You position the highlight, press Enter, and you'll get a screen that says "See the possessives entry in main section." By this time the Daily Planet has come out with its evening edition.

A lot of useful information is packed away in the KeyNotes/AP Stylebook. You'll find the same information in the convenient spiral-bound book version for a lot less money. And you may find it a lot faster, too .- Edward Mendelson

KevNotes Writer's Handbook

When you discover that a reference book is incorrect in its treatment of matters that you know about, how much will you trust its treatment of matters that you don't know about?

KeyNotes Writer's Handbook brings that question to mind in the world of computer references. This package is Digital Learning Systems' \$29.95 pop-up refer-



Doc 1 Pe 1 In 1

Boc 1 Pg 1 Ln 14 Pos 12

ence on all aspects of writing. It includes nutles and guidelines for diction, epidies rules and guidelines for diction, epidies, and forms of address. It adds suggested formats for business letters and lists of abbreviations, holidays, and foreign expressions. It defines consume terms and explains just about every sign and symbol included in the IBM PG charters and explain just about every sign and symbol included in the IBM PG charles. It's packed with useful details. But it also includes some about mises the support of the su

A list of proofreading symbols includes "o" and says in means "correct an error." Proofreaders will be astonished by this news. A list of foreign words defines au naturel as French for "nude." The phrase means "cooked simply, without seasoning," it means "nude" only as a pike. The definition of faux pas as "a false step" is literally accurate, but puzzling to anyone who doesn't know that the phrase means a social misstep of bulunder. De rigueur does

not mean "obligatory"; it means "prescribed by fashion or custom."

The program's list of computer terms repeats the old myth that the term debug on list start when someone removed a most from a computer in the 1940s, in the most from a computer in the 1940s, in the 1940s and the start of the 1940s and the 1940s and the start of the 1940s and the 1

Some of the program's grammatical rules are questionable or worse. You're told to use who or that when referring to things. This doesn't even hint at the important distinction in meaning between "The program that gets these things wrong is called KeyNotes Writer's Guide' and

system to accomplish this.

"The program, which gets these things wrong, is called KeyNotes Writer's Guide." The first of these sentences is the answer to the question, "What is the name of the program that gets these things wrong?" The second is the answer to the question, "What is the program that you

have on your screen?"
It isn't especially easy to find information in this program, either. You have to
step down a series of means to find the
word you wart, and if you're looking up a
word in the first half of the alphabet and
wart to check a word in the second half of
through M list and start over in the
through M list and start over in the
stire database cody when you invoke it
from one of the high-level menus, not
while you're in the data screens.

Whether or not you're a writer, you probably need a calendar and a list of holidays. The KeyNotes Writer's Handbook



Hard-Disk Backup Easy as Shooting Fish in a Barrel!



P.O. Box 1711, Austin, TX 78767 Telephone: (512) 328-1041

Now for OS/2! Point-And-Shoot PC-FullBak is now available for your OS/2 system.

AST! Point-And-Shoot PC-FullBak is the fastest backup utility—period! Run it on your IBM C, XT, AT, or PS/2 30, 50, 60, 80, OS/2 or true hardware

SIMPLE! Just use the light-bar menu to select orderines, subdirectives, subdirectives, subdirectives, and individual files you want to back up 18 ack up data all over your hard-disk with a single command!

RELIABLE! Point-And-Short PC-FullBak keeps your data sale—but don't take our

reliable RESTORE."—Jim Seymour, Micro Business

A BARGAIN! PCF-utilbat, you'd never have to talk about the data that got away, And at only \$129.95, it's a bargain! Available at quality software retailers or from sat (\$12) 328-1041. Your satisfaction is guaranteed—or well reland your money! And that's no fish story.



AWARD-WINNING Software!

uct has never failed to give me a

e award-winning family of ducts from Westlake Data Corp. has received PC Magazine's Editor's Choice Awa and has been IN.L. nominated for Magazine's Technical

CIRCLE 465 ON READER SERVICE CARD

Key Tronic announces A satisfaction guarantee



an end to the rat race. makes you the winner.



Let's face it. With so many different mice on the market, making the right choice has been a confusing decision.

But not anymore.

Because now Key Thonic introduces the Professional Series Mouse, the mouse that's backed by an unbeatable satisfaction guarantee. If you are not completely satisfied for any reason, return it to Key Tronic for a replacement. Or your money back.

With a guarantee like that you really can't lose. What's more, everything about this mouse is designed with your satisfaction in mind. Take getting started, for example. Key Tronic's documentation is written in clear and easy-tofollow English — instead of "computerese."

If you have any questions at all, however, a trained expert is only a phone call away.

phone call away. Key Tronic's toll free support line makes it that easy.



key tronic *Professional Series*

spreadsheets — faster and easier.

The mouse has even been carefully designed to fit the contour of your hand — a benefit

that translates into less fatigue, greater productivity, and a lot more enjoyment.

No other mouse package offers so many reasons to be satisfied. Top it all off with the satisfaction guar-

antee, and it's sure to be the mouse you'll reach for first.

So celebrate the end of the mouse rat race. Contact your local Key Tronic dealer or call 1-800-262-6006. In Washington state, call (509) 927-5515. Then find out more about the mouse that's guaranteed to make you a winner.







ure, you're going to love the new look of Sigma Designs' LaserView Display System. But the real beauty is in

how well it handles your desktop publishing, spreadsheets and word processing.

uite simply, LaserView offers the sharpest image anywhere: an eye-opening 1664 x 1200 (115 dpi) resolution for detail drawings, halftone images, or even 6-point type. And an additional resolution mode of 832x600 for text-based work (for the Macintosh II and SE).

So what you'll get is the performance of a workstation in a PC environment. A full 19" monitor that's easy on the eyes, thanks to its high contrast screen: easy on the body because of its tilt/swivel base; and easy to work with, since you can view anything from a two-page spread to an engineering drawing.

ut it all together and you have a single monitor solution for IBM PCs and Macintosh II or SE. With full software compatibility. LaserView allows you to see your work the way it was meant to

be seen. No matter what software CIRCLE 252 ON READER SERVICE CARD

vou're using - Ventura Publisher. Pagemaker, Excel, or whatever.

ant a closer look? Visit your nearest authorized Sigma Designs dealer. Or call Sigma Designs today at 415-770-0100.

Then see why the newest screen star isn't just another pretty face.



01 Landing Parkway



includes calendars for 1986 through 1988. But the version we received in the fall of 1987 listed holidays only for 1987. -Edward Mendelson

Word OuickRef

No one outside Microsoft's publicity department pretends that Microsoft Word is simple to learn or that its logic is easy to remember. Worse, Word's on-line help rarely seems to offer the information you need. If you want a memory-resident cheat sheet that can help you avoid Word's pitfalls, consider American Training International's \$99.95 Word OuickRef. Even experienced Word users can be instructed and distracted by the lively pop-up tutorials in Word QuickRef. When you can't think of anything to write, you can watch the tutorial type out documents for you.

in and loads Word automatically. Press the gray Minus' key while working in Word. and a small window pops open with an alphabetical list of Word topics and commands. As soon as you scroll to a heading, a larger window displays a screen or two of information. You can get a quick summary of the Alt-key format commands, or a chart of the function keys, or an explanation of Word's math operations.

The program recognizes many of Word's dangers and peculiarities. It warns you, for example, that you must set margins for running headers, and, even better, tells you how. But it doesn't emphasize

> Word QuickRef American Training

International Inc

(800) 421-4827

(213) 823-1129 List Price: \$99.95

12638 Beatrice St.

Los Angeles, CA 90066

FILE

ACT



PROGRAMMABLE MACROS

Reming head

through the general definitions of the different functions, like running heads and other formatting

The best addition to limit's n ros. These can be as simple

nd you can write an autoexec you start the program

Perfect's: you switch on a keystrokes you want to

acro and save it in the

text that you're storing in the deletion buffer when you decide to clean up your text by

deleting a single character. The program's list of topics isn't meant for absolute beginners, if you don't know how to save a file, you won't learn how by looking under Save-or even under Transfer Save, which is Word's name for it. Neither of these terms is listed in the index. But you can learn the basics from Word OuickRef's four tutorials, which are accessible via the gray Plus key. These walk you through most major topics, from editing to mail merge, by making you type in the correct keystrokes, while working in Word. The program feeds in keystrokes too, so using a tutorial is like playing a Word duet with your computer. The tutorials last up to a quarter of an hour, and you may feel trapped at times. Don't try to escape with the Esc key. The program adds to the sense of claustrophobia by blocking off that tempting and obvious exit.

You can learn a lot from these tutorials. The format lessons introduce you to more kinds of tabs than you ever wanted to meet. And when you're finished with the mail-merge lesson, you'll be able to use such tricky commands as the one that inserts text when a field is greater than a specified sum

Word QuickRef covers Word, Versions 3.0 and 3.1, but the tutorials stumble when they try to work with 4.0. The program insists on using Word's character mode. If you try to use Word QuickRef when Word is in graphics mode, you will see a graphic display of disaster. You'll have no trouble with a conventional monochrome or color monitor, but a Hercules Graphics Card Plus displays all of Word QuickRef's menus in underlined italics. The program needs about 80K in addition to Word's minimum of 256K

if you've upgraded your copy of Word to Version 4.0, you'll find that it gives better help than 3.1 did and even lets you segue into the tutorial while in the middle of the program. But Word OuickRef still can be useful for quick reference, especially if you like to see an extra window or two superimposed on the eight text windows you

can get in Word itself. -Edward Mendelson

ires: 320K RAM, two disk drives. DOS 2.0 or later In Short: A detailed enide to Macrosoft Word, Version 3.1, with clever tutorials Quicker and simpler than Word's own help screens. Not copy protected.

How much would you pay for a device that does all this:

- · Print Master II lets all your computers easily share all your printers, plotters, and modems, reducing the cost per user of expensive peripherals.
- · Print Master II spools print jobs in its smart 256K buffer (field expandable up to 768K), then outputs them in sequence to keep your computers and printers working.
- · Print Master II allows computers to select each other so you can share data bases and transfer files.
- · Print Master II makes choosing a connection as easy as moving your cursor. You select where you want your data to go from a popup menu generated by BayTech's memory resident program.
- Print Master II. Model 808E. features eight flexible ports; six serial and two parallel. You can set any port, including both parallel ports, as a computer port or a printer port.
- · Print Master II's serial ports operate at real speeds up to 9600 baud, even when all

ports are operating at the same time. You can set baud rates, plus other configuration changes, for each port.

- · Print Master II handles protocol conversion automatically (i.e. serial/parallel. baud rates, handshaking, etc.), so it's compatible with virtually all makes of computers, printers, plotters, modems and peripherals.
 - · Print Master II can be used in conjunction with the printer server of a LAN to help off-load network traffic by providing port expansion and extra buffer.
- Print Master II features many little extras that make a big difference in performance: shielded connectors, a built-in power supply, easy-to-read configuration menus, fewer parts for higher reliability, sturdy metal case.

How about \$595? Call us to order direct or for the name of your nearest dealer.



il Associates, Inc., Data Communicati 200 N. Second St., Bay Saint Louis, MS 39520 USA Telex 910-333-1618 BAYTECH, Telephone 601-467-8231 or toll-free 800-523-2702

CONNECTIVITY •

CONNECTIONS

Clustered

Saving space and defending vital data are chief among the reasons for choosing a clustered CPU system over a PC workstation. Discover four alternatives for outfitting the bare-bones network.

FRANK J. DERFLER, JR., AND WALTER ADAMS

tered CPU terminal commands a dedicated PC. Anyone can hit Ctrl-Alt-Del anytime and not bother anyone else. But the power supply, disk drive, attached printer, and other peripherals of the server are shared among all the users.

In these days of bargainpriced computers, clustered CPUs don't necessarily represent the least expensive way to put standalone PC power on a desk. They are, however, a very competitive way to give people networked PC resources. If you ignore the cost of the server, the average peruser price of a clustered CPU system is about \$1,000, complete with video display and keyboard. You would have to pay that much today for a single-disk-drive PC clone, but you would also have to add \$300 to \$400 worth of networking hardware and

space, comfort, and security are important for any working environment. For many of us. happiness is a computer display and keyboard that you won't wrestle with for desk space. Happiness is a computer that won't let someone walk out with a megabyte of stolen data on a floppy disk. In short, happiness is a clus tered CPU system. Essentially, clustered CPU is a PC on a circuit board with a remote connection to a small, diskless, noiseless

desktop terminal. The system's circuit board includes a microprocessor plus the RAM and other computing circuitry that you find on a PC's motherboard. This circuit board resides either inside a PC AT (or similar machine acting as a server) or in a special cabinet beside it. Each person using a clus-

software in order to get all the same capabilities of the clustered CPU system.

DESKTOP CONNECTIONS A clustered CPU system comprises one of two equipment combinations: an RS-232C terminal with a PC-like keyboard and display, or a standard PC monochrome monitor and keyboard joined by special long cables to the CPII and host. Both have their advantages. While the standard-keyboard-and-monitor approach does provide better monochrome graphics capabilities, the cabling scheme needed to extend the video and keyboard signals is much more complex than with the RS-232C.

The products reviewed here employ both combinations. Cubix Corp.'s Quick-Link and QuickLink IV systems use RS-232C-connected terminals as desktop workstations. Allow Computer Products PC-Slave/286 works the same way, but the PC II from Advanced Digital Corp. joins a monochrome monitor with a PC keyboard

to provide a desktop workstation. With either type of CRT/keyboard combination, the name of the game is functionality stripped to the bare bones. If you're looking for frills like color, a mouse, or expansion slots, then a clustered CPU is not for you. Forget about desktop

publishing and CAD Where clustered CPUs work best is in activities like word processing, spreadsheets, LAN administration, electronic mail, database management, and programming. These systems' major advantages are the small size of their desktop displays, their low output of heat and sound. and the security gained from diskless oper-

On the flip side, perhaps their primary drawback is their reliance on one central machine that acts as a server. If the server goes out of commission, all the hosted CPUs fail, too. A minor drawback of those systems that use the extended-keyboard and video-monitor architecture is the cost and bulk of the cables.

All the clustered CPUs reviewed here can run under Novell's Advanced NetWare. An important benefit of this ability is that you can combine clustered CPU stations with regular NetWare stations on the same network. A clustered CPU system is a good way to expand an

1-1-61	PC II Personal Network Station Advanced Digital	PC-Slave 286 Alloy Computer	QuickLink IV*
	Corp.	Products	Cubre Corp.
List price (per station)	\$1,195	\$1,295	\$2,295
Microprocessor	Dual 80188	Single 80286	Four NEC V40s
RAM	512K per CPU	1MB	768K per CPU
Clock speed	8 MHz	8 MHz	8 MHz
Terminal	PC screen, keyboard	Serial terminal	Serial terminal
Connection	Special cables	RS-232C	RS-232C
Ports	1 serial port	1 serial port	1 senal port
Runs under	NetWare	Network/OS, NetWare	NTNX, NetWar

-Indicates Editor's Choice

*The performance of the QuickLink (\$695), with a single server on a card, matches that of the QuickLink IV, with four CPUs to a card

existing network of PCs or to start a network that standard PCs can join later using Ethernet, StarLAN, Token-Ring, or other shared-media products.

REMOTE IAN ACCESS There is another handy LAN-related use for clustered CPU cards. The full-featured LAN operating systems from Novell, Banyan, 3Com, and other companies provide a way for a remote station to call into the network over a telephone line. But using this approach is agonizingly slow because the software used to make the station a part of the network has to exchange many data packets dealing with file handling and DOS messages between the workstation and the server. These exchanges take a long time when they have to go through the phone line at relatively slow speed. Because of this limitation, companies like Novell recommend using a software package like Carbon Copy, PC Anywhere, or Remote to remote-control a PC on the network and just pass screen images and keystrokes through the telephone lines instead of detailed DOS messages.

Normally, this remote-control approach ties up a PC and its network interface card. By attaching a modem to the serial port on a clustered CPU card, of a PC to remote-connection duty without investing in another complete machine. the space in which to put it, a network interface card, and cabling.

TESTING THE SYSTEMS When you look at clustered CPU systems, you have to evaluate them twice-in comparison with standalone PCs and with stations on a network. You need to know how well the system runs regular PC programs without shared data files, and how well it works with shared data files.

The standalone performance depends on such factors as the CPU speed and how long it takes to get data to and from the screen and keyboard. Network access performance factors include the same considerations plus factors like the design of the server interface logic and how data is routed from the server's hard disk.

On the one hand, clustered CPU systems are directly connected to the server's bus. Theoretically, this architecture provides very high-speed access to the disk drive and to other shared resources. And the lack of cable access protocols, packets, and tokens drastically reduces the communications overhead

On the other hand, the workstation's CPU must devote a certain amount of its however, you can dedicate the equivalent processing power to monitoring and ac-

INTRODUCING THE G/ETHERNET LAN: RY STANDARD

Plug-compatible with other Ethernet® LANs.

And outperforms the competition every time.*



You want standards. Now the developer of G/Net,™ one of the most popular PC LANs in the industry, has introduced G/Ethernet. It meets all the specifications of the IEEE 802.3 networking standard. And because it follows the standard. G/Ethernet is plug-compatible with most Ethernet cards.

You want speed. With Gateway's G/Ethernet, you get the fastest Ethernet on the market today. As much as 339% faster, and that's without the added cost and complexity of special file server cards. We engineered G/Ethernet to its maximum capacity so that it's capable of handling heavier network loads than most other Ethernets.

You also want expansion capabilities. So G/Ethernet is fully compatible with Gateway's complete line of wide area communications products. Using our multi-user gateways, you can connect G/Ethernet users to a variety of micro, mini, and mainframe resources virtually anywhere in the world. And you can easily bridge G/Ethernet to any number of Advanced NetWare Sbased LANs using G/Remote Bridge,™

And you've always wanted support. With G/Ethernet, you get more than just a great LAN. You also get the best support service in the business from a total communica-CIRCLE 146 ON READER SERVICE CARD

tions solutions company - support enjoyed by over 100,000 satisfied G/Net users. G/Ethernet is available from your local Gateway reseller right now, with virtually all versions of Novell Advanced NetWare. And because we were the first LAN vendor ever to run NetWare, nobody supports NetWare better than we do. We've got what you want. And we've got proof. Call today for our FREE G/Ethernet Performance Comparison Testing Report. See for yourself how G/Ethernet outperforms the competition.

> 1-800-367-6555 (714) 553-1555 in California

2941 Alton Ave . Irvine, CA 9271

NOW AVAILABLE IN MICRO CHANNEL FOR

cessing the host's bus. In a LAN using conventional PCA, these tasks are done by the network adapter card and whatever built-in intelligence it has. Remember, too, that the slowest factor in the performance of any shared-file system led electromechanical action of the hard disdrive. This action is the same regardless of whether the request originates from a clusretted CPU system on the server's borr from a PC transmitting through the network.

You also have to be careful in comparing the benchmark test results for these
clustered CPU systems with our results,
from tests of more-conventional LANs.
All the other LAN tests use SMHz ATs
with 80286 processors as workstations.
The clustered CPU systems use a variety
of processors; three of the four reviewed
here, for example, use slower processors
than the 80286, resulting in slower benchmark-test times.

The network benchmark test results for bees systems pace them in the thick of the pack. They have about the same performance as an AT operating on a Low, which is neither the fastest nor the slowest type of system we've tested. The names may be a title disappointing considering that the cards work directly on the server's bus. But except for the Alloy system, these aren't AT-class machines and they can't have adapter cards to help carry some of the communications lead.

The bottom line is that clustered CPU systems will give you respectable performance using both applications that stand alone and those that share data files. They are practical and desirable alternatives to PCs for the majority of the applications used in a workgroup.

ADVANCED DIGITAL CORP. PC II Personal

Network Station

In 1980 a group of engineers founded Advanced Digital Corp. in order to produce add in boards for S-100 single- and multuser systems. In 1984 the company entered the IBM PC-compatible market. Having applied its experience in developing products for the S-100 market to developing a "cost-effective solution to the



ADC's PC II Personal Network Station takes a conservative approach and uses standard PC monitors and keybourds at each destage; the cabling extends typical monochrome monitor and keyboard connections. Two processors are on each circuit board, but an add-on daughterboard can crowd into the space of an adjacent slot.

Advanced Digital Corp.'s PC II Personal Network Station Topology (Network Station Topology (Network Special Helphand and veloc abile) Serior running solet Next Stream Of Station Of St

multiuser PC problem," Advanced Digital now offers a product line that includes the Turbo 386 accelerator board and the PC II Personal Network Station, a clustered CPU system.

ADC takes the conservative approach to clustered CPU design. Its system uses a standard IBM-type monochrome monitor and a PC keybourd (color monitors and XT- or AT-type keybourds need not apply). The monitor and keybourd connect to the CPU card and server through a special cable about half a inch its dicaments. As the desktop, you attach the keybourd material to a special boot that terminates the cable.

Each PC II board supports two workstations. The base price for each board (with 25 feet of cable) is \$1,195. You'll probably want to add an option giving each station a dedicated serial port; this brings the price to \$1,395, or about \$700 per workstation, plus the cost of a monitor and keyboard.

You can use the PC II hardware with the Network/OS operating system from CBIS or with Novell's Advanced NetWare. If you use it with NetWare, then you need the \$1,395 version of the board because it contains an interrupt controller chip used by the NetWare workstation software.

LAN WAR

AXON declares the LAN WAR for the benefit of those who demand flexibility, performance, and support—no matter how little it costs.

Flexibility and performance are provided by AXON XT and AT workstations and by two AXON LAN models!

The AXON Serial Manwork (S100) uses the installed serial port of the computer. The AXON High Seed herwork (F200) is equipped with a 2 MB card. Both models come with the necessary hardware and software. Features include: Disk, Directory and Printer Sharing-File and Record Locking and Sharing: Electronic Mail; easy to use Pulldown Menus; Twisted Pair Wiring; NETBIOS Compatibility; and More.

So, if you anticipate light traffic on a small network, buy AXON S100 for \$89 per node. For more power and speed, buy AXON S200 for \$249 per node.

Call the number below and AXON will tell you wby flexibility, performance, support, and price will turn the LAN WAR in to your profit.

AXON COMPUTERS, INC.

9025 Wilshire Boulevard, Suite 204 • Beverly Hills, CA 90211



CIRCLE 395 ON READER SERVICE CARD

CABLE PROS AND CONS Because the monochrome monitor is connected to the equivalent of a monochrome graphics card, you can use applications that take advantage of the monochrome adapter's highlighting and graphics capabilities. Also because of this direct connection, the screen scrolls text and spreadsheets just as fast on the remote workstation as it would connected to a local PC

The cable that gives the PC II system its capabilities also creates restrictions. Each board is shipped with 25 feet of cable for each of the two workstation locations; you can buy more cables and connect them together to a maximum distance of about 200 feet. ADC also markets a kit that boosts the video/keyboard signals, allowing a maximum reach of 2,000 feet. And according to ADC's documentation, you must purchase the company's own keyboard/video connection cables. Other cables may not work because of the need to maintain the system's electrical characteristics.

At the CPU end of the system, each card carries two Intel 80188 processors running at 8 MHz and the other RAM/ ROM and video chips necessary to make two almost-complete PCs. The card needs a long 8-bit slot in the host machine, but that's not all. Unfortunately, the plug-in daughterboard that gives the ADC system its local serial ports and full NetWare compatibility increases the width of the board

and makes it occupy a large part of an adiacent slot. There is room to put a short card (like a Novell keycard or certain short network interface cards) in an adjacent slot, but in many installations the PC II card will effectively occupy two slots.

The serial ports on the PC II cards don't extend out to the workstation termination box. Also, no local parallel port is available. This means that if you want to have a printer next to your desk, you have to run a separate serial cable. In most installations, you'll probably use the serial port for a modem and do your printing through the network on shared printers.

INSTALLATION ADC's installation manual is deceptively simple. If you carefully follow the standard instructions and have a server already configured for NetWare, you can complete the initial installation in about an hour

We ran into some problems installing NetBIOS capacity and had to spend time with ADC's technical support people. An updated manual, made available to us late in January, should help you avoid the problems we experienced. ADC also supplies a completed NetWare shell for its CPU cards, so you don't have to endure a separate shell-generation process.

Once installed, the PC II system does much better on our benchmark tests than a standard XT. Operationally, the directly connected screen provides full-speed scrolling. We found no software incompatibilities during nearly a month of using this system.

The most serious shortcoming we did find in the PC II is its configuration with 512K RAM instead of the maximum possible 640K. Since the NetWare shell takes about 50K RAM, these systems are more limited than nonnetworked PCs with the same memory. They definitely need every byte they can get.

Because the IBM PC AT uses expansion slots for controller and I/O boards and because the PC II cards overlap into adiacent spaces, you can only get two of these cards into an IBM PC AT. ADC markets a device called the PC-Exbus, a ten-slot expansion chassis that allows you to use more PC II cards.

Overall, PC II cards provide faster (monochrome-only) screen response than



The Connectivity

his chart is designed to help you select This chair is designed. transfer and resource-sharing alternati As you can see on the chart, if all you ly need to do is exchange files or share printers, then you should consider devices such as PBXs and patch boxes. If your organization has not already invested heavily in PCs or DOS programs, then a minicomputer might meet your needs more economically. But if you want many users to share data files simultaneously under DOS, a LAN may be the best iternative. Once you've decided on a LAN, the need for station-to-station source sharing and other factors will influence your natwork purchasing

Because manufacturers include many different features in their networks, some products will not fit neatly into one decision box in this guide. You'll also find that the lack of differentiation between LANs is becoming as large a problem in the LAN industry as the lack of standards as 2 years ago. But overlapping features and technical similarity between networks are good news for potential buyers. They will let you concentrate on more-tradition factors such as dealer support and price tead of on more-technical con-

ews originally appeared in PC Magazine:

- December 9, 1986 cember 23, 19 nuary 13, 1987
- January 27, 1987
- ٠ February 10, 1987 February 24, 1987
- March 31, 1987 April 14, 1987 May 26, 1987
- June 9, 1987 June 23, 1967 July 1987
- August 1987 mber 29, 1987
 - October 27, 1987 nuary 12, 19 nuary 26, 19
- March 29, 19 pril 26, 19
- lay 31, 19 August 1988
- Black marker indicates current issue.



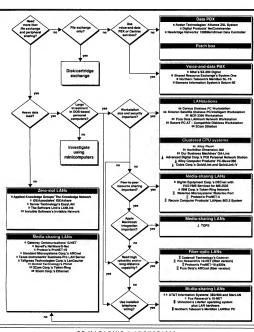
PC II Personal Network Station

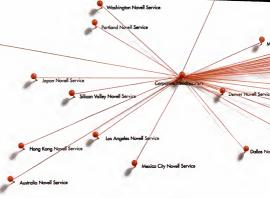
Advanced Digital Corp. 5432 Production Dr Huntington Beach, CA 92649 (714) 891-4004 List Price: With one 25-foot cable for each workstation, \$1,195. With one serial port for each workstation, \$1,395. Keyboards and

monitors not included. Requires: Network running under Novell's Ware and DOS

In Short: Offering processing power for two workstations, the PC II card is hosted in an AT server with special cables connecting to ed PC keyboards and mon

rs. A reasonable way to add workst ons to a network or start a small new one





One of Novell's most doesn't come

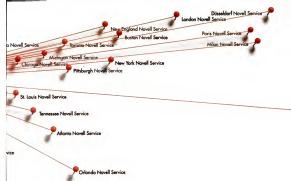
Every time you invest in one Novell network, you're really getting two. The first is your network operating system, the one that comes in a box. The second is the Novell Services support network, the one that helps you get the most out of the one that comes in a box.

The people network. Novell Services is the vast network of people, services and products supporting Novell systems worldwide. With service centers in major cities throughout the world, and trained Novell authorized resellers providing service in scores of other markets, the Novell Services network of professionals reaches practically anywhere.

Total systems support. Perhaps Novell's best-known service is the HOT-LINE telephone support program. If you need more in-depth service, Novell also offers a wide range of on-site maintenance agreements.

But trouble-shooting is only the beginning. Consulting services are also available for users with systems integration needs. And expert Novell technicians can even perform remote diagnostics on your network system.

Network management help. For better network management, Novell Services offers NetWare Care⁻⁻ for gathering vital data about system performance and configuration. And



important networks in a red box.

Novell's Service Response System™ lets you provide your own departmental or customer service using the Novell Technical Information Database.™

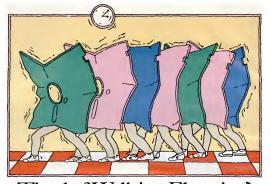
Network education services. Novell offers over a dozen education courses through Education Centers worldwide. Courses are even available on disk through Novell's computer-based training programs. And the NetWirelelectronic bulletin board keeps you updated on new products and technical developments.

For total systems support, plug into the one Novell network that's far too big in size and scope to fit in a box. See your Gold Novell Authorized Reseller, or call 1-800-LANKIND.

For more information, call from your modem 1-800-444-4472 (8 bit, no parity, 1 stop bit) and enter access code NVNSD6



For network solutions, you should be seeing red.



Tired of Walking Floppies?

Get rid of your tennis shoe network with ManyLink.

You need to share a document, so you walk a floppy to an associate. Or you need something printed, so you walk a floppy to someone who has a printer on their PC. Which means they have to stop what they're doing, Maybe you have a message for someone. Or just want to chat. More walking, More interruptions. More bother.

Stop walking, start sharing.

You can stop walking floppies around and start sharing documents, printers and messages—all three features—from one software package: ManyLink for PCs. It even allows you to do 5.25" and 3.5" disk

conversions between PCs and PS/2s.
No other PC network is so
versatile or so easy to install and run.
Or so economical. You can connect
two PCs with ManyLink for only
\$165.

Share files while you work. It's simple. With a couple of keystrokes you can request a disk file from another ManyLink connected PC, then go back to your work. File transfer is accomplished "in the background" — without interrupting you or the other PC. A polite beep on your computer tells you when the file arrives. Files you don't want to share can be locked to protect data from network access.

Share printers without leaving your desk.

Send your jobs to any printer connected to a PC running Many-Link. While your job is being printed, you can continue your work because all printing—like file transfering—occurs unnoticed in the background.

Chat with another PC user.

You can send and receive brief messages to another ManyLink connected PC without leaving your application. Telephone messages, instructions, questions or whatever...appear on your screen.

Costs that won't run away from you.

ManyLink for PCs fills your networking needs now and can grow easily and inexpensively as you expand. Each \$165 ManyLink for PC package contains all you need to make two PCs communicate: a 25° serial cable, instruction manual and software. Each additional package allows you to connect another PC, and so on. Add PCs as you want, when you want,



Take a walk (or run) to your dealer now for ManyLink for PCs. Or contact NetLine, 85 West Center, Provo, Utak 84603. Telephone: (801) 373-6000.

NetLine

clustered CPU systems using RS-232C-connected terminals. This is particularly important for spreadsheet users who frequently scroll their screens and want to see charts. The workstation cabling used by the PC II is thicker and more awkward than modern RS-232C connections, but the keyboards and screens are standard devices available now at very low prices.

ALLOY COMPUTER PRODUCTS PC-Slave/286

PC-Plus is Alloy Computer Products' name for an entire line of clustered CPU products, which includes cards, software, and expansion earliers. At the time of our first review of PC-Plus products'. Making of the products' of the products of the pro

One of the general advantages of clustered CPU systems is that they are handy for expanding existing networks, many of which use NetWare. So when Alloy delivered the PC-Slave/286, a PC-Plus card with NetWare capability, the company earned a place in this review.

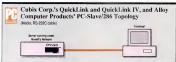
286 PERFORMANCE The Alloy PC-Slave-286 cand is the only product we tested that uses the 80286 processor. In every neasurement, our standalone FC benchmark tests show the Alloy card performing as well as an 8-MHz IBM PC AT, with a slight edge over the clustered CPU competition. At \$1,250 f(plus an average of \$400 for a terminal), Alloy gives many AT clone makers commetition. To

Each PC-Slave/286 card carries a megabyte of RAM, so 640K of memory is available to DOS applications. At the time of our review the extra RAM space was not used under NetWare, but Alloy notes that the code to turn the extra RAM into a virtual disk is ready for the software's next release.

One problem, however, is that each card has only one CPU: you need one card slot in the server for each user you add.



The Alloy PC-Slave/288 system puts only one processor on each circuit board, though that processor is an 80286 with a 16-bit-wide address. Connection to a terminal is made through RS-232C wiring, with only four wires used in the cable.



The cards are made with the extra connector needed to join with the 16-bit socket in the AT's bus, but they will operate in either a 16-bit-or an 8-bit-wide slot.

TERMINAL CONNECTIONS Each PC-Slave/286 card connects with a terminal through an RS-232C link. Only four wires are used for the RS-232C signals, so if your building is properly wired and spare pairs are available, you can connect the terminals through existing telephone wiring. If you can't use existing wiring, you can use relatively small RJ-45 wire and plugs to extend the connection over a counter of hundred feet.

Each card has one additional RS-232C serial port for connection to a modern or printer. If you want to have the printer or modern on your desk, you have to run another serial cable. Parallel printer capabilities are available only through the shared resources of the network.

The monochrome video adapter on the PC-Slave/286 card emulates the Hercules GB101 graphics card. As a result, you can use any program that is compatible with Hercules graphics to display graphs, charts, and other images on the terminal.

IMPRESSIVE ACROSS THE BOARD

The PC-Slave/286 system performed well as both a standalone and a networked device. The graphics screens seemed amazingly quiek. We scrolled text and a sprach steet, and the movement looked at least as fast as a similarly equipped AT sitting next to the Alboy terminal. The video benchmark tests confirmed what our eyes told us: Allow screens move fast!

We tested the system with all of the cards mounted in the 16-bit-wide slots inside an IBM PC AT. As expected, the effect of the 16-bit-wide address and 80268 processors was seen in the benchmark test results. The cards were fast, and, particularly in the DBMS test, we saw thit effect from simultaneous operation of several stations.

Alloy is a powerful entrant into the No-



(617) 873-6100
LERI Price: \$1,295; Alloy NetWare Support
Kii, \$195 per server, \$395 to \$595 per terminal.
Requires: A Novell or NTIX server and an
RS-232C terminal with IBM PC video characteristics and keyboard.
In Short: Enjoying a performance edge over
the others reviewed here due to its 80226 pro-

In Short: Enjoying a performance edge over the others reviewed here due to its 80286 processor and 16-bit-wide address, this system can be connected using existing telephone wiring. Excellent performance, but each card serves only one workstation. GRICLE 602 OF HEADER SERVICE GARD

PE Be

Benchmark Tests: Clustered CPU Systems

A mong the factors that affected the performance of our clustered CPU systems, three slood out: the design of the vendor's software interface to Novel's NetWare the speed and type of processor, and the type of interface between the processor and the host machine, an 8-MHz IBM PC AT.

machine, an 8-Mrtz IBM PC AT.

The overall top performance of Alloy's PC-Slave/286 card suggests that it takes full advantage of its 80286 processor and 16-bit data bus addressing.

Our Network Speed Under Load test shows that the QuickLink card had a hard time handling the small data-block sizes used in the test. Typically, programs don't produce

small data blocks in such profusion. Therefore, the lest is more important for distributed LAN stallions attempting to share a cable. In the Database Load tests, the close performance times yielded by the PC II and QuickLink cards under each workstation configuration are the result of fast data bus access

Performance Times

and excellent caching by NetWare.

Network Speed Under Load One Three Two stations station stations stations PC It Personal Network Station 035 980 985 1.106 1.206 QuickLink IV PC-Slave/288 403 509

Hard Disk Access Load	Zero stations	One	Two stations	Three
System				stations
PC II Personai Network Station	314	451	699	865
QuickLink IV	322	436	557	640
PC-Slave/286	186	216	246	281

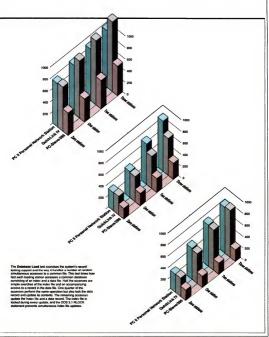
| Delibbitis | Color |

The Network Speed binder Load and the Netal Claik Access Load benchmark tools manaure the fine network to perform a standardized bask on the network. While the actual work hooks used for three the lettle (described below) are different, we used the same procedure for both To obtain the eligibest times shown horse, we san a benchmark program performing a sequential create, or another times to a larger fall and the standard and an acceptant and to a larger file.

The record sizes used in these activities systematically retails between 16K, 4K, and 512 bytes. The numbers shown in the fuse dimensional chart are the total time necessary for all of these operations. We rain the test on a dio or AT to load the network while timing part one of them. We then reduced the number of workstations one at a time to show the effect of loading on the network.

The Herberth Speed Under Load set pich a herely load on the natwork mentions (catads, media, and so from) which placing a minimal load on the hard disk but of loom) which placing on minimal load on the hard disk but the solution of the hard solution of the hard disk but the hard disk but the hard disk catadomy. The load file catadomy, the load on the hard disk is even martier, annot cached systems hybriday perform a disk write but do not review a nathrical disk read.

The Hard Olak Access Load test heavy loads the hard dak and dak caching system. To do this, each station randomly accesses to own 100K data file using 1K records. Date written to the file is changed each time. The random reads typically access data outside the cache, which forces a dak need, as does any write.



■ CLUSTERED CPU SYSTEMS



The processor benchmark tests show that the QuickLink and PC II systems give performances more typical of a 1-bb AT than of an 8-bit PC. The high CPU clock speeds go a long way toward overcoming the differences between 8- and 16-bit processing. However, the 80286-based PC. Slave/286 system unmistakably excels at math processing and memory.

than the AT.

management tasks.
For a bette comparison of product speeds, the IBM PC AT and the PC-Slave/286—both of which use 80286 processors—were timed in the 8086 Instruction Mix as well as the 80286 Instruction Mix as well as the 80286 Instruction Mix perchangk tests.

Video Benchmark Tests

The Direct to Screen benchmark test mastures the bandwidth of the video adapter by writing directly to the display memory buffer. The test is performed is video mode 3. The entire screen is updated using the assembly language REP 5105W instruction with register CX equal to 2000. The is done 1,000 times, and the result shown is the total of the 1,000 times.

The Video BIOS Routine Without Scrolling benchmark test measures the speed of the BIOS Teletype routine without scrolling. The test is performed in vision mode 3. The screen is cleared, and 24 lines of 80 characters each (rockding a terminating carriage return and line feed) are writen to the display through the BIOS Teletype routine.
This is done len times, and the result shown is the total of
the ten trials.

The Video BIOS Routine with Scrotling benchmark test measures the speed of the IOSC fell-type routine with scrolling. The test is performed in video mode 3. The screen is cleared, and 240 lines of 50 characters each (including a terminating comage return and line Issel] are written to the display through the BIOS Terlippe routine. Although the first 24 lines written to the display do not involve scrolling, all the remaining lines scroll the display do not involve scrolling, all the remaining lines scroll the display.

VE 4 -- DIGG

Video BIOS

Performance Times (Times given in seconds)

(Times given in seconds)	Direct	Routine Without	Routine with Scrolling	
System	to Screen	Scrolling		
PC II Personal Network Station	4.89	2.75	4.83	
QuickLink IV	8.79	9.73	8.18	
PC-Slave/286	1.48	1.04	8.41	
IBM PC AT with monochrome monitor	4.89	4.06	6.10	

CPU Benchmark Tests

The NOP benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocesors and the affect of memory caching. This test executes almost nothing but NOP ("No Operation") mechine code instructions in a

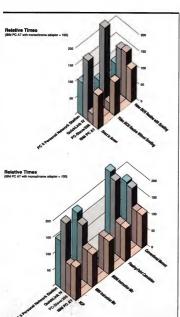
The 8006 instruction Mix benchmark test measures the time It takes to execute a selected senes of processor intensive takes. The test program uses 6006 instruction code. These instructions are a subset of the total processor instruction set.

The 80286 Instruction Mix benchmark test measures the time it takes to assouts a selected series of processorintensive backs. The test program uses 80295 instruction code. These instructions are a subset of the total processor The Floating-Point Calculation benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, supprinted ton, and logarithms and tigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Complet 4 or

The Conventional Memory benchmark test allocates 256K of conventional memory and treats a se a sense of 64-byte records. Then, 16,364 random records are read into and written from this memory. The result shown as the average of

Performance Times

(Times given in seconds) System	NOP	8086 Instruction Mix	80286 Instruction Mix	Floating- Point Calculation	Conven- tional Memory
PC II Personal Network Station	5.98	16.92	N/A	82.72	2.09
QuickLink IV	8.73	14.72	N/A	77.22	2.01
PC-Slave/286	3.90	8.92	8.79	35.50	1.27
IBM PC AT with monochrome monitor	4.17	8.95	8.85	35.48	1.29
N/A-Not applicable: products have 8086 processors.					



vell-compatible clustered CPU market. Alloy's PC-Slave/286 cards take up one slot per customer and cost more than the 8bit cards offered by competitors. But they deliver good performance.

QuickLink

QuickLink QuickLink IV

InterContinental Microsystems was one of the pionens of multiuser, multiprocessor PC systems in 1981. Its original S-100 system boards allowed multiple CPM-based applications to work together, and ICM used this experience in developing the QuickLink processor board for the PC and Novell's NetWare. When Cubix Corp. acquired ICM in early 1988, the QuickLink and QuickLink IV products began to be marketed under the Cubix name.

The QuickLink gives you the functionality of one PC on a circuit board for \$695. The QuickLink IV combines four PCs on a circuit board for \$2,295. Several companies, including IBM and Link Technologies, make terminals you can use with the QuickLink systems; their prices range from \$300 to \$600.

The QuickLink IV is an impressive piece of design work. The board's designers used ASIC (application-specific inte-



to. The QuickLink IV can add four sta

the server.
CIPCLE and ON READER SERVICE CAND





"What am I doing here?"

I guess I have a reputation for saying what's on my mind. So when the people at Everex asked me to be in their ad, I said it was okay as long as they let me have the floor.

The reason I like their Step 386/20 is simple. It's fast. It is definitely the fastest machine that I've seen so far.

When they sent the machine over, I put it through every benchmark test I could find. I finally gave up. It was the highest on all of them.

Give me the choice and I'll use the fastest thing I can get my hands on. This happens to be it.

What can I say? I like the beast. For your nearest

authorized Everex
Computer Systems
Reseller call
1-800-356-4283.
Everex,
48431 Milmont Dr.,
Fremont, CA MSSR.
CIRCLE:160 OR RADBE SERVICE CARD

As 20MHz thack the lastebeast free ever First the piece to to meet?

John C. Dvorak Columnist, PC Magazine

 IBM PS/2 Model 80 (20 MHz)
 3.52 MPS

 Compaq DeskPro 386/20
 4.59 MPS

 Everex Step 386/20
 4.91 MIPS

Power Meter MIPS Version 1.2. The Database Group.





The QuickLink IV clustered CPU system from Cubix Corp. combines four processors on a single circuit board, as opposed to one on the original QuickLink board. Each processor connects to its monochrome display terminal through R5-32C cabling.



grated circuits) and high-density packaging. The result? By putting one card in the bus of a Novell server, you can add four workstations that can run both standalone and networked DOS application software.

The Novell software drivers allow you to connect a maximum of 16 QuickLinks to one server; with an expansion chassis, you can run roughly 10 or 12 of these cards off one server. If you use QuickLink IV

cards, however, you can run all 16 workstations from one AT-compatible server. (You run out of slots more quickly using a genuine IBM PC AT because its I/O ports are on expansion cards, separate from the motherboard.)

The Cubix products use RS-232C-connected terminals that are attractive and small; they offer features like swivel bases and AT-style keyboards. The terminals connect to the CPU card in the server through small eight-wire RJ-45 cables that use modular connectors slightly larger than those on your telephone.

ARCHITECTURE AND OPERATION Cubix's CPU cards capture outgoing information in the screen buffer and pass it through a set of drivers controlling the terminal's screen via the RS-232C link. This setup is both an advantage and a disadvan-

The positive side of this architecture is flexibility. New drivers can easily tap into advances in terminal technology. As new terminals and faster connection schemes

QuickLink and QuickLink IV provide an excellent alternative to buying another PC to install on the network.

emerge, it will be easy to change the driver software to use them. Today's 38.4-fishobelper-second R5-222 (speed limit, showever, stows down screen updates. It in it a log problem for terminals working with nongraphic applications (restricted to the control of the control of the control of the storil test fearly as fast asy you can on your own AT. But for certain PC-ype graphics terminals (for which Cubir also markets software drivers), the response time is limited by the communications link.

The unobtrusive RJ-45 cables have a length limit of about 50 feet, according to engineering specifications. In practice, systems often work well using cables many times that length. You can use larger (and more expensive) round RS-232C cable to so greater distances.

If you need more distance between the workstation and CPU card, or if your work environment contains a lot of electrical noise, you can choose to use cables and connectors meeting the newer RS-422 specification. If you decide to install RS-422 wiring after you but the Cubix boards.



PC-Slave/286

Are you looking for adequate performance at a low price or excellent performance at an acceptable price? In this case, we opsed for performance and rhose alloy is PC. The performance of the performance and rhose alloy is four serve or displays and AT-level processing power. And consider is four-wire connection scheme, which gives it the potential to sulfite existing elephone wire. It isn't the lowest-cost route, but is should meet most users' needs through expansion in many directions.

you'll heve to change a couple of integrated circuits. You'll also need a separate RS-422-to-RS-22 convetter (Cubik has a kit) to connect the cable to the RS-232 port of the terminal. RS-422 provides a maximum cable length of 4,000 feet. RS-322/CRS-422 cables are wicely evailable; Cubix adheres to the industry standards and provides good documentation.

HIGH COMPATIBILITY. The company's choice of the NECV 409 (1805 and incorporcessor for the Quicklink cents is significant: It provides a high degree of hardware/software compatibility with the BIM PC family, because it uses the same instruction set as the 8088/8086 micraprocessors. The Vold also combines and of the support chips previously needed to design ePC. This means ecompact board, without a loss of functionality. And it design ePC. This means ecompact board, without a loss of functionality. And it without a loss of functionality. And it without a loss of functionality. And means are supported to provide the provided of the MHz and posts performance times more than twice as fast set and a PC.

Another important design consideration is the amount of RAM available to each V40 processor. Both Cubix cards bout 76% of on board RAM.

The QuickLink IV has an advantage over the QuickLink in performing our LAN tests. The QuickLink IV's card has the extra connector needed to use the 16-

bit data bus in the host AT. This speeds access to the bus and helps cut down on conflicts between competing cards. As the number of stations simultaneously running the tests increased, the advantage of the QuickLink IV card climbed to almost 30

percent.
There is only one functional difference between the QuickLink and the QuickLink (V. The QuickLink gives you a serial foldirectional) printer port at the terminal and a serial port on the card at the serve the QuickLink IV has only the serial port at the Emminal. The second serial port on the CPU card is handy for connecting to printers or moderns that aren's shared through the network but are still away from your desk.

EASY ENSTALLATION Both of the Cubic cards install easily into the slots of an AT, all you need is a small screwdriver and a few minutes. The RL-45 suble snaps into the card just like a telephone cord. Next you snap the cord into the RL-45-to-RS-232 converter and plug the convertice the serial port on the back of the terminal looks best on the left- or the right-hand side of the desk.

If you have any experience installing a Novell network, you'll find the ICM software installation process relatively simple. Cubbx provides a complete instruction manual that follows the Novell manuals' page/instruction format. Experienced Novell installers will like the Quick Start section. If you are using a previously prepared server, you should be able to install the cards and the software in under an hour.

Both the QuickLink and QuickLink IV cards are examples of solid engineering. They integrate flawlessly into the Novell environment and can be upgraded as PCcompatible terminals improve. They provide an excellent alternative to buying another PCt o install on the network.

Frank J. Derfler, Jr., is our connectivity specialist and workgroup systems editor of PC Magazine. Walter Adams holds backbur's and master's degrees in electrical enigneering from Rensselacr Polycechnic Institute. He works as a LAN administrator and computer communications specialist with the federal government.

"YOU That's whet PC Magazine hed HAVE A to sey ebout PC-File+, and now this powerful COMING" determines.

program is even better: NEW1 Grephs to help you meke your point. Includes: pie, ber, line, scatter, end smoothed average. NEW1 8087/80287 meth coprocessor support for lightning fest operation. NEW1 Expended record end field lengths hold more deta.

With PC-File+ version 2.0 you get these end 26 other additions to the database that is elreedy the fevorite of over half-e-million users.

Why do people like PC-File+ so much? It's effordable (just \$69.95). Technical support is excellent (just cell). And its features (on-line help, 10 sort levels, lebeling, and mail merge, just to neme e few) rivel those of products thet cost 5 times es much.

So treat yourself end give PC-File+ e try today. Call 1.800.JBUTTON for the name of the dealer neerest you. (In WA 206.454.0479.)

PC-File +. Just \$69.95 for a product that should cost hundreds.

"Affordable, high performance software is possible. All it takes is true commitment to customers."—Jim Button



BUYING THE RIGHT PRODUCT AT



Amdek
Video 210A 12" Amber 89.00
Video 410 12" A/G/W (ea.) 135.00
Video 432 PS/2 A/W VGA169.00
VIU00 432 POIZ AVV VOA 109.00
Color 722 Dual Mode RGB449.00
Color 732 12" PS/2 VGA499.00
Magnayox
7BM623 12" TTL Amber85.99
CM8762 14" Comp/RGB279.00
9CM053 14" Hi-Res EGA379.00
8CM873 14" Multimode FGA . 449.00
7BM749 14" Flat VGA White Call
NEC
1402 Multisync599.00
1402 mullisylic
1501 Multisync-Plus 999.00
2001 Multisync-XL 20" VGA 2099.00
Peckard Rell
PB-1418F 14" Flat TTL A/G/W 129.00
PB-1418F 14 Flat I IL A/G/W . 129.00
PB-1422EG 14" Hi-Res EGA 359.00
Polariod
Palette EGA Pius2499.00
Princeton Graphics
Princeton Graphics
Max-12 12" TTL Amber149.00
HX-12E 12" EGA479.00
Ultrasync 12" VGA579.00
Selko
CM-1430 14" VGA639.00
Zenith
ZMM-149 4" PS/2 Amber209.00
ZMM-149 4 FO/2 AIIDEL209.00
ZCM-1490 14" VGA Ang 699.00

MAGNAVOX 9CM082 14" **VGA Monitor**

Boca Research
Top Hat 128K Expansion99.00
Boca Multi-EGA169.00
Bocaram/AT O-4MB Card149.00
DCA
Irma 2.2 3728 VO749.00
Everex
EV-159 Ram 3000
EV-657 Micro Enhancer II 149.00
EV-673 Everex Evga Adapter279.00
5th Generation
Logical Connection 512K429.00
Hercules
Color Card
In-Color Card239.00
Graphics Card Plus199.00
IDEAssociates
IDF-5251 Emulation Board 579.00
Intel
Inboard 386/AT & 386/PC Call
4020 286 Board w/512K 369.00
8087 Co-Processor119.00
80387-18 Co-Processor 529.00
NSI
Smart EGA Plus219.00
Quadram
Quad 386-XT PC Upgrade 799.00
Model-30 Quadboard PS/2319.00
The Complete PC
Complete Answ. Machine 299.00
Complete Hand Scanner 219.00
Tseng Labs
EVA 480 EGA Adapter219.00
Video-7
VEGA EGA Deluxe Adapter229.00

VEGA VGA Video Adapter....299.00 Zuckerboard Monochrome Graphics Card...79.99

MULTIFUNCTION CARDS

AST Six Pak Plus 576



5th GENERATION Logical Connection 256K







OVER 3000

COMPUTER MAIL ORDER

THE RIGHT PRICE ... EVERYTIME!

COMPUTERS

AST
Premium 286 Model-140Cal
Compaq 386 Deskpro's & Portables Cai
IBM
PS/2 Model 30, 50, 80, 80 Cal NEC
Multispeed EL-21499.00
PC-TOO
512K 8 MHz 1.2MB 80286899.00 Toshiba
1000, 1100+, 1200, 3120 Laps Cal
WYSE Model 50, 60 TerminelsCal
Model 50, 60 larminels



\$189 MODEMS

Anchor	
1200E External	30
ATD-Zuckerboard	
1200 Baud Nuda 1/2-Card	10
Best Products	-
Smart 2400 16-Card w/Soft 149.0	'n
Everex	~
Evercom 920 1200 Baud Int 895	
Evercom 940 2400 Baud Int 179.0	Ю
Hayes	
Smartmodern 1200 Ext	
Smartmodem 2400 Ext	20
Intel	
2400 Raud PS/Int. 3290	20
Practical Peripherala	
1200 Baud Int	00
2400 Baud 1690	
	N
U.S. Robotics	
2400 Baud Direct Int	
2400 Boud Direct Ext 1907	m

SOFTWARE

PANASONIC KX-P1080i 80 Col. Dot Matrix \$169

PRINTERS 180cps, 152 col. 386:00 40cps, Designer 480:00 40cps, Designer 480:00 7 Feschiells MacKell 470:00 75 S5cps, Delayesh 470:00 75 S5cps, Delayesh 470:00 75 S5cps, Sc col. 750:00 75
180ps, 132 cot. 389.00 Moppe Mop
40cps, Design/heel. 66800 Fraccimile Machine. 97800 Personal Copier. 94900 35 SScps, Design/hl. 47800 150cps, 80 col. 17800 240cps, 80 col. Cell 2,040cps, 132 col. Cell 180cps, 24-Wire. Cell 330cps, 80 col. Cal 330cps, 80 col. Cal 340cps, 80 col. Cal 350cps, 80 col. Cal 340cps, 80 col. Cal 350cps, 80 col. Cal 350cps, 80 col. Cal 340cps, 80 col. Cal 350cps, 80 col.
Fascimile Mechine
Personal Copier. 949.00 35 35cps, Dalsywhl. 479.00 150cps, 80 col. 179.00 240cps, 80 col. Call E, 240cps, 132 col. Call 180cps, 24-Wire. Call 330cps, 80 col. Call 330cps, 80 col. Call 334cps, 24-Wire. Call 334cps, 24-Wire. Call 34cps, 24-Wire. Call 35cps, 24-Wi
35 35cps, Daisywhl
150cps, 80 col. 179.00 240cps, 80 col. Call E, 240cps, 132 col. Call 180cps, 24-Wire. Call 330cps, 80 col. Call 334cps, 24-Wire Call
240cps, 80 col
E, 240cps, 132 col
180cps, 24-Wire
180cps, 24-Wire
334cps, 24-Wire Call -Packard
-Packard
nink Jet369.00
Pinwriter 24-Wire379.00
Inwriter 24-Wire
inwriter 132 col
Postscript Laser3595.00

LQ-500 180cps, 24-WireCall
LQ-850 330cps, 80 col
LQ-2500 334cps, 24-Wire Call
Hewlett-Packard
2225 Think Jet
NEC
P2200 Pinwriter 24-Wire379.00
P660 Pinwriter 24-Wire469.00
P760 Pinwriter 132 col
LC-890 Postscript Laser3595.00
Okidata
ML-320 80 col. 300cps 379.00
ML-292 80 col. 240cps389.00
ML-292 80 col. 240cps
ML-390 24-Wire 270cps
ML-390 24-Wire 270cps
ML-390 24-Wire 270cps. 519.00 ML-293 132 col. 240cps. 529.00 ML-393 24-Wire 450cps. 999.00
ML-390 24-Wire 270cps 519.00 ML-293 132 col. 240cps 529.00 ML-393 24-Wire 450cps 999.00 Panesonic
ML-390 24-Wire 270cps 519.00 ML-293 132 col. 240cps 529.00 ML-393 24-Wire 450cps 999.00 Panesonic 529.00 KC-P10911 194cps, 80 col 209.00

L-390 24-Wire 270cps
-293 132 col. 240cps
L-393 24-Wire 450cps999.00
nasonic
(-P1091i 194cps, 80 col209.00
(-P1595 240cps, 132 col479.00
(-P154 24 wire, 132 col599.00
erp
300 Fecsimile Mechine 1349.00
ar Micronics
C-1000 140cms 80 col 179.00

		24-Wire
in the	HEA	and in Canada

d-base III+ Copy II PC... 129.00

79 99

cpac Easy Acco	unung/a
First Choice	SOFTWARE
F	PUBLISHING
	GROUP First Choice
200	\$84 QQ

Fox Software	
Fox Base+ Development	. 219.00
5th Generation	
Fastback Plus	89.99
IMSI	
Page Perfect Desktop	. 339.0
Optimouse w/Dr. Halo	79.9
Logitech	
Hi-Res Buss Mouse	99.9
Lotus Development	
Lotus 1-2-3	. 299.00
Meca	
Managing Your Money	. 119.0
Microrim	
R:Base For DOS	. 499.00
Microsoft	
Microsoft Mouse Bus/Ser	. 109,0
Norton Software	
Utilities 4.0	54.91

Word Perfect Corp.

Word Perfect 5.0.... Ventura Publisher 1.1.....

NX-15 120cps, 132 col.....

Call toll-free: 1-800-233-8950. Outside the U.S.A. call 717-327-9575, Fax 717-327-1217

Educational, Governmental and Corporate Organizations call toll-free 1-800-221-4283 CMO, 101 Reighard Ave., Dept. B1, Williamsport, PA 17701

ar. For faster delivery, use your credit card or send cashier's check or bank money order. Credit cards are not charged until we ship. Pennsylvania reside add 6% sales tax. All prices are U.S.A. prices and are subject to change, and all litems are subject to availability. Detective software will be replaced with the same item only. Hardware will be replaced or repaired at our discretion within the terms and limits of the manufacturer's warranty. We cannot guarantee compatibility. ty. All sales are final and returned shipments are subject to a restocking fee. We are not responsible for typ



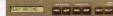
ur Standard Is Loaded

When people asked for a 24-pin dot matrix printer that could handle just about anything, we went straight to work.

And we came back with four of them. The Toshiba P321SL, P321SLC, P341SL and

we put in more useful features than any other printers in their class. Our fanfold bypass.

for instance. lets you print single sheets without having to unload your continuous form paper from the built-in tractor. And our simplified front panel makes printing as easy as touching a button.



There's even an optional automatic envelope

feeder on our P351SX. All of which improve

the way you handle paper. To improve the way you look on paper, our multistrike film ribbon produces dark, crisp type, no matter which model you buy. Our 360x360 dpi graphics offer a higher resolution than most laser printers. And you can do it all in color with our P321SLC. Or our P351SX with its optional color kit.

Also standard is a wide array of resident fonts and emulations for virtually all software. Not to mention our unsurpassed 24-pin print quality. All with a speed of up to 360 cps for draft and 120 cos for letter quality.

So call 1-800-457-7777 for the name of the Toshiba printer and computer dealer nearest you.

You'll find our input does wonders for vour output.







In Touch with Tomorrow

Harmony TO YOUR NOT THE IS HARMON, VESSOR 2.04. BOOKS

W accounting modules, Open Systems has given purveyors of the bottom line a fine integrated package that's scket in both appearance and structure. Harmony reflects the same concern with under the property of the same, with the popular Open quality that went into the popular Open unclibes up to its name, with very few some notes to be found. What's more, the company has repositioned the program's principle (effective lab), 1 1988) away from the crowded high end to a new midrange very soften and the content of th

Harmony consists of a growing uray of modules, ranging in price from 579 to 5799, that currently include General Ledger, Accounts Psyable, Accounts Receivable, Inventory, Order Entry, Psyroll, and Client Accounting, along with Word Processor, Spreadshert, Information Manager of authases, reporting facility, and applicaless of the control of the control of this year. We concentrated on the current ingle-user version, though we did examine briefly a 3Com multiuser implementation, which is Setcheld for release sontion, which is Setcheld for release son-

Data entry screens are consistent and easy to understand, and anextensive use of windows for entry options realers things even easier. The fine user interface is also complemented by an intelligent use of screen color.

A number of comprehensive learning

With more than a dozen modules priced from \$79 to \$799, Open Systems' Harmony integrated accounting program can automate an office on any budget.

and reference aids help keep training time to a minimum. Each accounting module comes with a Setup Assistant that provides checklists and workheets to let you get the module up and running quickly and efficiently— are all benefit for the first-time comparer user. Well-de-signed on-line to arrivals do a good boy of showing you the work, the F2 key summon context sensity to be provided to the provided on the prov

Running any of the Harmony modules requires the System Manager module, which users of Open Systems Accounting Software should recognize. It makes navigating your way through Harmony a simple precess, sepecially since terables you to configure the menus however you want. It also performs general housekeeping routines, handles printing, and provides password protection. GENERAL IEDGER Hammony's General Ledger module can function alone or in concert with other modules. Predefined financial accounts and statements allow you to become productive quickly. Stander charts of account codes are provided for four types of organizations—distillent countryings, service companies, retained, and accounting firms—and there's also more for your personal records. Unfortune one for your personal records. Unfortune of the contract of the con

Harmony lets you track up to 99 sepaate profit centers by placing the two-digit profit center code anywhere in the 12-digit account code. The profit center scheme will not let you track a department or cost center within a profit center, however. If you need to report on subgroups within a profit center, this limitation makes the process cumbersome.



List Price: System Man

ager, 599 (L.A) extension, 5101), Accounting, Sonn, 5101, Accounting, Sonn, 5101, Accounting, Sonn, 5101, Accounting, Sonn, 5101, Accounting, Software, Sonn, 5101, Accounting, Software, Software, Software, Sonn, 5101, Accounting, Sonn, So

Export, \$79 each (no LAN extension needed).

Requires: \$12K RAM (640K for 3Com LAN version), hard disk drive, \$132-cohann printer, \$3Com's 3Plus and Novell's Advanced NetWare for LAN version, DOS 2.1 or later.

In Short: Harmony is a solid integrated ac-

counting package with a sleek, consistent data entry interface that makes extensive use of windowing. It offers quite a comprehensive range of features, although certain design limitations may make it unsultable for some businesses. Not copy protected.

DOCI 469-DAPPA/DES[RO]CARD

Partnerships and Subchapter S corporations with several partners will like the profit distribution feature, which lets you distribute a percentage of profits to any number of retained earnings accounts.

When inputting journal entries, you can pop a window up to select the proper account numbers. Journal entries can be manual or automatic. You can also make entries that automatically reverse in the subsequent period. Unfortunately, though, these entries won't reverse in the final period of the year, when this feature would be most sueful.

After inputting a journal entry, you can review or correct a journal entry listing before posting it. This batch processing approach is commendable for reducing errors and preventing you from unnecessarily re-

versing incorrect entries.

Harmony never folses the books, so adjusting journal entries can be made to any period in a specific year. Since this feature holds the potential for entering data accidentally into the wrong period, Harmony warnsy out fyou're posting to a noncurrent period. You can keep the books open on the Auditors Adjusting entries for an indefinite period—a feature your auditors will like.

The system provides a handy bank reocciliation feature, as well as a set of financial tools that help you perform installment on analysis and persent - and future-value calculations. Harmony also includes a rudimentary graphics presentation capabilily, letting you cahart and graph detailed account activity and financial trends for up to for different accounts—using budgetary, current, or prior-year information for 12 periods.

ACCOUNTS PAYABLE Accounts Psyable can stand alone or be integrated with the General Ledger. Like the Ceneral Ledger, this module also supports batch processing, which means transactions don't have to be posted as they are entered. Before posting allows you to correct information or follow up on questionable items without abandoning your entered data, thereby swing you a lot of time.

When initially setting up Accounts Payable, you configure a posting table to define default financial accounts for detail

OUR REVIEWERS

G. William Dauphinais, creator of the Price Waterhouse Report and a frequent contributor to PC Magazine, heads the Management Consulting Services in the Price Waterhouse St. Louis office. Ray A. August, a senior consultant for

the Price Waterhouse Comprehensive Professional Services group in Hackensack, New Jersey, specializes in financial management reporting systems. Edward M. Knetlet, a senior financial consultant for the Price Waterhouse Comprehensive Professional Services group in Cleveland, Ohio, specializes in installing Pchseed accounting sys-

Timothy J. Lee, a Management Consulting Services manager in the Price Waterhouse St. Louis office, specializes in management information system planning.

posting to the General Ledger. This table can specify up to seven accounts that will appear in every purchase, return, and recurring transaction. A better approach, however, would be the one that many other systems have adopted, which allows you to specify default accounts for each vendor. For instance, when entering an electric utility bill, only the required utility expense account should be presented as a default for that invoice.

You can make queries to the vendor master file and get back updated data that reflects any recent entries. This capability gives you immediate access to information concerning payment cycle, tax status, credit terms, remaining credit, high credit balance, discounts taken and lost, or last invoice and payment amount. You also have access to aging information, an entryby-entry listing for all transactions, and a list of unpaid or partially paid invoices with aging given in days.

When you're inputting a transaction, the windowing feature lets you call up a complete listing of all vendors, add a vendor, or display a list of General Ledger accounts. Harmony also performs data entry validation but unfortunately has no provi-

ACCOUNTING ON THE FLY

Each of Harmony's modules includes a system of windows that allow you to take glances at one part of your books while you're doing work somewhere else.



Harmony's windowing feature allows you to add a new vendor when you're entering a purchase in the Accounts Payable module.



A popule window in Hatmeny's locuntury module can calculote the true economic order quantity for different vendors and help determine the quantity that best uses your funds to meet expected demand.



When entering a payment in Harmony's Accounts Payable module, you are given options to help apply the amount automatically against your balances.



When you're entering orders with Harmony's Order Entry module, you can add a new customer on the fly and link it to the pricing, tax, commission, and trade discount tables.

sions for preventing redundant vendor invoice entries.

If you deal with manual checks or partial prepayments to suppliers, you cannot enter a partial or complete payment using

the Invoice screen alone. You must first enter these invoices from a Payment Journal entry screen, which translates into some extra time spent switching between the two screens.

The Payment Journal entry screen allows you to select certain invoices to be paid on a certain date, whether or not they are due. This is handy if your vendors require frequent early payments. When entering a payment to a vendor, you are given options that help you automatically apply the amount against your balances. The option to pay all invoices automatically with an available discount encourages a financially sound policy.

When the end of the year rolls around, if you enter the Federal 1099 limit, Accounts Pavable will print 1099 statements for all required vendors.

ACCOUNTS RECEIVABLE Accounts Receivable lets you make queries for customer information concerning finance charge rates, credit limit, remaining credit, high balance, discounts taken and lost, finance charges assessed, date and amount of most recent invoice, last payment received, and aging. You can also access an entry-by-entry listing of specific transactions or a list of paid or partially paid invoices with aging information. As with Accounts Payable, all information reflects any recent entries.

Accounts Receivable provides a good opportunity for taking advantage of Harmony's integration features. Using Harmony's word processing module with a Dunning Report file, you can automatically print dunning letters. You have the option of selecting recipients directly from the customer master file or merely specifying selection criteria, such as the number of days or the amount overdue. The setup also allows you to personalize letters for

specific customers. A sophisticated finance charge feature provides a table from which you can choose up to ten different formulas for charging interest to customers. With each formula, you can specifically state an interest rate, the maximum to which a rate can be applied, a second-tier rate to be applied to amounts over that maximum, the number of days past the due date that interest should be charged, a minimum amount to be charged for interest, and whether the interest is classified as simple or compounded. This is very helpful if you conduct business in states with different usury laws or if you stratify interest charges



Terminal emulations for DEC VT-100 / 52, IBM 3101 (character or black mode), Televidea

910 / 920 / 925 (character or block mode), Adds Viewpoint, ADM-3A, Dato General

336 Office Plaza Drive

Telephone (904) 878-8564 Telex: 6714280 KLON

AMROR 5 is designed for use on IBM and IDD's com

D210, ANSI and Honeywell VIP7200 . Learn mode for the outomatic creation of outo- Full screen Wordstor-like text editor Site License (the cost effective way to standardize)

logon Scripts

60-Day, No Questions Asked Money-Back

Guarantee To order, call Toll-Free:

In Florido cell 904-878-8564] Visa / MasterCord / COD \$5.00 for Shipping and Handing (\$8.00 for COD orders) Florida residents MRRCR II and SolMone are recoments of SolMone Dentourns Corp. / IBM is a reco

CIRCLE 478 ON READER SERVICE CARD

1-800-634-8670



COREfast, is the only backup software to be awarded PC Magazine's Editor's Choice fortwo consec-

secutive years.

Now with the new enhanced COREfast

2.0, you can save even more time and money while protecting your data Speed, Save time. Back up 10MB in

vanced features such as multiple DMA channels Data Compression. Save diskettes. Back up as much as 40% more on

each diskette. Data Integrity. Save worry and headaches. Our read verify option and advanced error correction code as-

sures reliability and the integrity of your data. Easy Operating Mode. Save effort. Easy to learn. Back up an entire

diskette with only two keystrokes. **Advanced Operating Mode.** Save unnecessary backup. File management and catalog features allow you

to back up single or multiple files from many directories. Scheduled Backup. Save data loss. Automatic timed reminders never let you forget to back up your files.

without the aid of an operator. COREpower Your Backup, Contact your nearest dealer or CORE

representative today. Northeast Region: Southern Region:

203/357-1339 407/997-6055 Central Region: Western Region: 312/439-0511 213/312-8130

International Sales: 407/997-6044. FAX: 407/997-6009

contact Pride Computer Dist.

Distribution through Kenfil, MICRO D. Gates. GBC Distributors and Vitronics, In Canada,





If the world had one computer communications

The fact is, today's bewildering variety of computers demands a

program like this. CROSSTALK® Mk. 4 is the

entirely new generation of PC com-munications software. Its language, CASL, is designed specifically for the needs of communications and related applications.

- · It helps your PC perform a variety of functions with a variety of different devices - direct-connection, modern, coax, or X.PC up to 15 sessions at a time, if you like.
- It emulates virtually all popular terminals — IBM, DEC, Data General, TeleVideo, ADDS Viewogoca maca bao taioa
- · It supports most popular modems.
- It supports the most widely used file transfer protocols, including XMODEM, YMODEM, KERMIT, CompuServe "B", CROSSTALK, and its own high-speed DART.
- · It works with interfaces such as IRMA"and Smart Alec™ to



standard you wouldn't need Crosstalk Mk.4

facilitate connections with mainframes and minis.

Its language allows an unprecedented degree of automation of complex applications functions and contingencies.

It does everything you always wished your old communications program could do.

Maybe the world's computers can't be alike. But now at least they can communicate.

See your dealer for CROSSTALK Mk. 4, and let your

ROSSTALK Mk. 4, and let your nagination fly.

CROSSTALK COMMUNICATIONS/1000 Holcomb Woods Parkway, Roswell, Georgia 30076/(800)241-6393

A Division of Digital Communications Associates, Inc.

ROSSTALK is a registered trademark of Digital Communications Associates, Inc. / CASL, IRMA and Smart Alec are trademarks of Digital Communications Associates, Inc.

IBM is a registered trademark of International Business Machines Corp. / TeleVideo is a registered trademark of TeleVideo Systems, Inc.

CompuServe is a servicement of H&R Block / X PC is a trademark of Tyroshare, Inc. CIRCLE 326 ON READER SERVICE

■ THE PRICE WATERHOUSE REPORT

based on the size of your customer's bal-

Invoice entry is much the same as in Accounts Payable. The windowing feature allows you to inquire about a current customer or to add a new one. You can also specify which items are eligible for a discount and which are not-a good safeguard to prevent you from giving a discount on such items as shipping or postage.

Harmony offers several methods for quickly and efficiently applying cash receipts. The system can automatically apply the money received to the oldest invoices first, continuing to pay each invoice until the money is applied in full. Alternately, you can select each invoice manually. You then have the option of manually applying a portion or all of the receipt or having the full amount of an invoice automatically applied against the money received. Consistent with other aspects of the system, you can revise receipt application before posting your cash receipts.

You should find the receivables reporting capability quite useful. The Customer

 If the inventory module is integrated with Order Entry, that module will update the General Ledger automatically.

Cash Flow report presents a forecast of expected cash in-flow for up to three specific dates-providing an excellent cash management tool. The Aged Trial Balance report includes each customer's terms and

telephone number and can be used for the current period or periods at 30, 60, 90, and 120 days.

Another nice feature lets you personalize the statements printed for your customers. You can include detailed or balanced forward information, aging information, finance charge rates, and year-to-date finance charges. You can also add customized messages-even different messages for delinquency levels of 30, 60, or 90

INVENTORY The Inventory module can stand on its own or be integrated with Order Entry and Purchasing (when this last module becomes available). As a standalone module, it does not post directly to the General Ledger but instead prints a posting recap that you can use to update the accounts manually. If it's integrated with Order Entry, that module will undate the General Ledger automatically.

When your basic quantum leap is just not enough:

PROBAS.

Programming Library

PROBAG is a library of routines that kicks OuickBASIC and BASCOM into 5th gear and gives you powers and abilities far beyond those of mortal men. It's the greatest thing since sliced bread and if you don't get it today, your hard disk will crash in retaliation. So much for the hype. now down to brass tacks

- e 232 routines (226 in Assembly) • 600 page 3-part manual • Full-featured windowing
- Screen snapshots
- Virtual screens in memory Lightning-fast file I/O
 Access EMS as files or arrays
- Full mouse support
- equipment routines to handy string, date, time, and input routines. Whether you are just starting out, or a programming guru, ProBas will help you generate faster, more efficient code, in far less time - and we back that statement with an unconditional money-back guarantee! Thou

Plus 200 essential services from directory and of programmers have benefited from ProBas and its shareware precursor, ADVBAS For all versions of QuickBASIC and BASCOM including BASCOM 60 for OS 2 Just \$99.00

PROBAS. TOOLKIT

The ProBan Tool.Kit is a collection of assembly and BASIC modules that use the PROBAS library to save you even more hours of grunt work. Call up a ring, bar, pop-up, or pull-down menu. Pop a mini-word processor with word-wrap in a window. Put a list or file directory in a highlight window. You get:

- Loads of Menu Generators · Fast B-tree indexing · Mini-editor with word-wrap
- e Patch . EXE files Protected storage areas
 Display text files in windows
- Julian date routines · Documented BASIC source

Plus calendars. BCD math routines, clock routine Plus caendars, BLD main routines, clock rotunes and much more. In addition to the disk and 3-part comprehensive manual, you also get special access to the Tou/Krt SIG on our BBS system where ProBAs programmers from all over the world share their favorite Tou/Krt modules. If you can't call to download new modules, disks of you can't can't out of our window new montes, does or the latest uploads are available. The PaoBaa Toot.Kir is an ever-growing product that adds capabilities and helps conserve your most valuable asset of all—time! Just 199,00! CIRCLE 360 ON READER SERVICE CARD

PROBAS.

The TelleComm ToolKer is a collection of high level communications modules that plug into your code to provide popular file transfer protocols, terminal emulations, auto-dialing, phone data base, login scripts and more. Need to communicate with the world? Plug just the routines you need into your programs

- Xmodsm/Modem7/Xmodem-1k • Ymodem (single and batch) • CRC-16 and Checksum
- VT52, VT100, ANSI BBS etc. Auto Dialer & data base
- Soript language support
 Full terminal program
 Documented BASIC source
- The TeleComm ToolKit. Just \$75,000

SOOB SANDY SPRING ROAD + LAUREL, MD 20707

(301) 953-2191 call our BBS at (301) 953-773B



RampagePlus From AST.

These days, to really get power, you've got to have a Rampage, RampagePlus from AST-the most powerful mem-

ory/multifunction boards you can buy. With RampagePlus MC for your IBM® PS/2" Model

50/60, or RampagePlus 286 for your AT® or compatible. you can have: up to eight megabytes of memory. EMS 4.0 compatibility. OS/2" com-

patibility. And, optional I/O piggyback modules. There's nothing like them anywhere. By making the one simple decision to buy Rampage-

Plus, you can postpone making a lot of other decisions. If you're asking yourself: Do I need the extra functionality of EMS 4.07 Should I plan on converting to OS/27 Can I get the same power from my AT compatible as I can with a PS/2? Will I need to save slots for input/output boards? RampagePlus takes care of it all.

Of course, you'll be going on a Rampage designed by AST. That makes your decision even easier. After all, year after year, we've sold more memory/multifunction boards than any other company. Great boards, like SixPakPlus* and Advantage® And, after selling over three million boards, we're proud to say the RampagePius boards are the best we've ever built.

For one, they are the first memory boards to offer 100% EMS 4.0 compatibility. RampagePlus 286 has 12.5 MHz speed designed especially for fast AT compatibles, while Rampage-

Plus/MC runs with zero wait-states to get the most out of your PS/2s. And, both RampagePlus boards include SuperPak;"

AST's utility software programs. Finally, there's one thing you'll find on a RampagePlus that you won't find on any other memory board, the AST name. And that means that you can make a

on a Rampage, all at the same time. To find out how, call AST, (714) 863-0181, Operator AA26,

send as the coupor		mico i i	uice	amigea
Yes, send me more info	mation on:			PC 8/8
□ RampagePlus/MC	□ RampagePlu	s 286		
☐ Have an AST represe	ntative call me.			

safe decision and go

□ RampagePlus/MC	□ RampagePlus 286	
☐ Have an AST represe	entative call me.	
Name		
mul-		

Company Address

City/State/Zip

Send to: AST Research, Inc., 2121 Alton Avenue, Irvine, CA 92714-4992, Attn M.C.

CIRCLE 107 ON READER SERVICE CARD ffle East, call 44 1 566 4350; in the Far East, call: 852 0459 9113; in Cansala, call: 416 826 7314. AST logo, Rampage, Sochsbiffus and Advit a and AT reported and PS 2 and OS 2 trademarks international flusiness Machines. Corp Coronghi © 1988 AST Research, loc. All ingles reserved.

Zero. Learning Curve

SPF/PC

"The best editor by far for MVS programmers." AT&T, White Plains, NY

"This product is superb! There is absolutely no learning curve if one is already familiar with IBM's mainframe ISPF." Reader's Disest.

Pleasantville, NY

"SPF/PC is probably the most

outstanding utility we have."

USAF, Pentagon,
Washington, D.C.

"With 15 years of mainframe programming, I find SPF/PC to be the friendliest software on the PC."

Dun & Bradstreet, Basking Ridge, NJ

"Your product allows our programming staff to move from our IBM mainframe to PC's very easily, saving us time and money."

Certified Grocers of California, Los Angeles

Want more proof? Call or write for a free demonstration diskette.

SPF/PC, so much like the mainframe you'll forget you're editing on a PC.



1900 Mountain Blvd., Oakland, CA 94811 Telepone: (415) 339-3530 Telex: 509330 COMMAND TECH

■ THE PRICE WATERHOUSE REPORT

Installation options let you specify multiple stocking locations, one of four costing methods (FIFO, LIFO, Average, and Standard), and the default precision of decimal values for quantity (0 to 4) and pricing (2 to 4). You can retain historical detail for both sales and purchase activity in either monthly or summary form.

Three user-defined codes allow you to categorize your inventory items using a category name up to ten characters in length. You can then define a table of two-character codes with a 30-character description for each code. These codes can identify colors, sizes, or other characteristics of items in inventory. They can be quite handy when you turn to the Information Manager module to develop custom reports.

transcriptory pricing tables facilitate rather associational pricing japorithms. You can define a complex pricing algorithms. You can define a complex pricing structure linking the tables to peculific items or customers, classes of items or customers, quantity breaks, or yearly dollar-volume sales. Special tables even allow date-specific subsection of the month retail situation. Formulas to determine final sales price can incube calculations that sales price can incube calculations that subsections are considered to the complex pricing for a special of-the-month retail situation. Formulas to determine final sales price can incube calculations that the control of the contro

The system lets you track salesperson commissions based upon the inventory classes and customer classes set up in Accounts Receivable. Formulas again serve to establish the desired commission rate.

The inventory item number accommodates up to 18 alphanumeric characters. You can specify an alternate item that will be suggested as a substitute during order entry if the original item is out of stock.

You can also flag an item as discontinued. Harmony recognizes that in the purchase orders you receive, the customer's put numbering system may differ from the one you use. The program therefore lets you build an item conversion file to link each customer item number to the corresponding number in your own system. Then, if you are connected to the Order to the contract of the cont

orders must conform to the vendor's item number format.

If an item is stocked in pieces but sold by the case, you can specify alternate units of measure. In addition, you can establish a penalty charge in the event that a case is broken up for resale (an odd-lot sale).

INVENTORYANALISIS A particularly good cample of how Harmony can help make more-productive use of your resources its capability to calculate the true economic order quantity for different veneration or the control of the control of

 Harmony provides an excellent way to ensure that cost increases do

not erode your margins.

Harmony falls a bit short in tracking serital number inventory. The Inventory module won't let you record the serial or lot number of an item until it is sold. This limitation makes it of little use for chemical or appliance companies, which must rely heavily on tracking stocked quantities by lots or serial numbers.

The module does include one innovative tracking option, however. It will let you track extended warranty information by entering a serial number and a warranty expiration date during invoicing. The Serial Item History report then lists serialized items by customer or item for a given war-

ranty period.

Harmony makes accurate valuation of your inventory easier with a straightforward physical inventory process and a simple tracking of reserved thems. To process a physical inventory count, you freeze your inventory, print worksheets sorted by bin number or location, perform the actual

AMONG LEADING DESIGNERS. THESE ARE CONSIDERED STATUS SYMBOLS.

n-screen icons like these are just one of the reasons Computervision's Personal Designer' is the best micro-based CAD system available. Easy to read. Easy to use. The very essence of personal CAD.

Based on Computer-vision's unparalleled

microCADDS software, the Personal Designer lets you create engineering drawings and 3-D models

Tou can even get an optional I package that lets you add complex sculptured surfaces to your designs, a capability limited to larger systems until now.

Add to these functions like finite element modeling and analysis. igh-resolution shaded colored ctures, sophisticated user programming tools, and all the normal office uses of the IBM* PC AT, XT or compatibles, and you have a system of great value.

Add the fact that the fully BOTH BETWEEN documented Personal Computervision and you have a system in a class

by itself. And that's the kind of status anyone can annireciate.

Self-explanatory icons facilitate dimensio. ing to engineering standards. You may add sigue needs.



Shaded images of complex objects such as this value are readily generated. These images are invaluable for visualizing the final broduct and for assessing design

For more information call 1-800-248-PSBU (7728), In Massachusetts & Canada, 617-276-1094. Or write to: Computervision Corporation, PSBU, Building 16-2, 100 Crosby Drive, Bedford, MA 01730.

126 ON READER SERVICE CARD



FINALLY!

EASYFLOW

An on-screen flowchart processor that knows about flowcharts - not just a nother "screen draw" program that makes you do most of the work. As enother "screen draw" program that makes you do most of the work. As and organization charts. With it you can guickly compose charts. More important, you can easily modify charts so they are always up to date. Automatic: Why unloratic text ceretine within shapes both hortontable and

 Automatic: Fully automatic text centering within shapes, vertically. Fully automatic line routing & re-routing.

Fast: Written in assembly language for speed.

▶ Large: Charts up to 417 columns wide by 225 lines high. Chart too large for your printer? Exstrow automatically breaks the chart up & prints it in page size pieces.
▶ Standard: All standard flowcharting shapes included. Custom shapes can be ordered.

 User friendly: Don't take our word for it. PC Magazine* says "EASTFLOW lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts".

► Mouse: Optional but fully supported.

 It prints: On most popular matrix printers including IBM, Epson, Toshiba, HP LaserJet, LaserJet-Plus and many others.
 It plots: On HP7440, 7475, 7550, 7570, 7585B and compatible plotters.

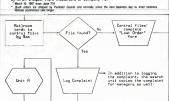
It works: We are contractually prevented from mentioning the name of the "big eight" accounting firm that purchased a world-wide site license, but we can tell you that they spent months evaluating all available flowcharting packages before

choosing EASYFLOW

Rush delivery: Order by noon today (eastern time) and we'll have it to you by courier tomorrow*. Rush delivery charge is \$15.00 (instead of \$2.00) and is available only in USA & Canada.

▶ Documented: 100 page manual plus over 150 screens of context sensitive help. EASYFLOW works on IBM PC's, IBM PS/2 and compatibles. Requires 384 K memory, DOS 2.0 or higher and an IBM CGA/EGA/VGA or Hercules monochrome compatible adapter card.

Order direct for only \$149.95 + \$2.00 S&H (USA/Canada), \$10.00 (foreign). Payment by M.O., cheque, VISA, Mastercard or Company PO.



The chart fragment above was produced on an HP Laserdet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time. CIRCLE 201 ON READER SERVICE CARD

HavenTree Software Limited
PO Box 1093-P Information
Thousand Island Park, NY 13692 Telefax(G2

Order Desk: 1-800-267-0668 Information: (613) 544-6035 ext 49 Telefax(G3): (613) 544-9632

■ PRICE WATERHOUSE

count, update the system, print a journal listing to check for errors, and post the adjournments when all corrections are made. Once posted, the stock balances and cost of sales are adjusted accordingly. The reserved status can let you track items pulled from inventory because of damage or obsolescence. You can then print a journal

listing to support your adjustment entries. When it consets to affording you an overview of your data by generating reports from it, Inventory does quite well, It can provide you with flash reports of period andyear-to-dam bistory. The Stock Status report details quantities on hand, committed, reserved, and on order. For reserved and discontinued times, there's a separate report. A salse analysis report is period and year-to-date quantities sold, sales, and gross sporfi figures.

A particularly valuable report summarizes your pricing structure for each item, calculating margin percentage from the list price and last cost. This is an excellent means for ensuring that cost increases do not crode your margins, and you would do well to turn to it periodically. It also lest you analyze slow-moving items, based upon the last sales date and inventory

A handy Purchasing Advice report calculates the order amount by subtracting quantities available and on order from the maximum desired levels set up for each item. It then shows the reorder point and economic order quantity for comparison and applicability. Running this report by vendor will show you item and alternate part numbers to assist in the reorder process.

ORDER ENTRY The Order Entry module functions as a powerful adjunct to the Accounts Receivable module, which must be installed for Order Entry to work. You can also integrate Order Entry with Inventory and the General Ledger. With its bucid entry screens, its windows for displaying and input options, and its on-line help, this component gets high marks for improving productivity.

Processing an order immediately updates the relevant quantities in the files ondisk. You can choose to have dollar amounts posted to Accounts Receivable in detail or summary.

You can classify new orders as regular, recurring, blanket, drop ship, or quotation. Recurring orders are repealed-containing similar order information over a period of time. Blanket orders require multiple shipments to complete the order without tracking the balance of the order as a backorder. Drop ship orders do not affect inventory quantities, since they reflect orders sent directly to your customer from a supplier's stock. However, they do update the sales history file. Quotations are used to enter and print a potential order for a customer. You can easily generate regular orders

from both quotations and recurring orders. When entering orders, you can record references to an order contact, purchase order number, and requested shipping

 Harmony can save you some aggravation with a feature that allows you to add an order from a new customer on the fly, without leaving the order entry screen.

date. The system can automatically fill in the current date as the order date, which in turn sets the appropriate accounting transaction date. It fills in the stocking location from the default you established in the options table, allowing you to change this if necessary. An order can have a maximum of 50 line items

To record noninventoried items, you simply skip the item number and enter just the description. Although you can then track these items through the Open Order report, a problem arises since the report does not show the item description. When Order Entry is linked to Inventory, there is no way of knowing which nonstock item is on order. Fortunately this isn't a liability when you're using Order Entry alone. since it always allows access to the item number field.

You can enter prepaid amounts, including check date and check number. These will post automatically to Accounts Receivable and the General Ledger when the order is posted. Harmony can also automatically hold any orders if they exceed a customer's credit or let you place a manual hold on an order.

Lookup windows play a key role in Harmony's data entry screens. For example, the item conversion table from Inventory, which links customer part numbers to your item numbers, is available in a window. When specifying order quantity, you can access the Inventory tables for current and alternate locations to examine quantities as well as to substitute items. This field is also linked to the alternate units of measure table, which you can call up if the sale

of an item involves breaking up a case.

If you need to enter an order from a new customer, a handy feature will save you some aggravation by letting you enter the new customer on the fly-without leaving the order entry screen. At the same time, you can include the appropriate codes to link with the Inventory tables for pricing and commissions, as well as Order Entry's own tables for sales tax and trade discounts

The trade discount table links discount percentages directly to a customer file in Accounts Receivable using the trade discount code. However, the discount rate normally applies globally for an entire invoice rather than on an item-by-item basis. If item-specific discounts are required by customer, you must set up the Inventory pricing tables accordingly to calculate the

proper selling price. Order Entry's sales tax table demonstrates how this module actually extends the analysis capabilities of Accounts Receivable. This table tracks both taxable and nontaxable sales by state, allowing a maximum of ten user-defined item classes per state, with different tax rates per item class if necessary.

Sales returns update the Sales History file for both the customer and item. If Order Entry is linked to Inventory, Harmony can flag any returned items that are damaged or otherwise unfit for resale and add them to the reserved file. This is a feature we haven't seen very often in comparable software.

Buyone, get one

productivity enhancers proven by over 300,000

ducts and get any other one free packages at your lavorite dealet. Then coupon you'll find inside and mail it to us. It's that simple. Coupon contained only in packages marked "FREE Software" and redeemable by users who register by



9/30/88. Void where prohibited

tasking that's easy to use. \$69.95





ew release 4.0 with advanced file recovery \$69.95

For more information, call 1-800-272-9900. (603)-627-9900 in NH

One Perimeter Road Manchester, NH03103 Offer Good In USA Only

■ THE PRICE WATERHOUSE REPORT

PRINTING AND REPORTING Once they're entered, you can print order confirmations and quotes for the customer's re-cords using Order Entry. You can also print picking slipse either by bin location or as items appear on the order. Although you don't have to print them out, picking slips are most essential in preparing invoices from orders, and you should use them for proper billing control.

To convert orders to invoices and create invoices not linde to the order file. Order Entry provides you with an invoicing screen identical in layout to the one used for recording orders. You may revise financial account data and order quantity from this screen, as well as enter serial number information for warranty tracking purposes. Backorders are generated if shipment was less than the amount ordered.

Unfortunately you can't customize the invoice format. This inability is a bit of an obstacle if the predefined form doesn't suit your needs. You do, however, have the option of printing a standard comment at the bottom of each invoice. When it comes to printing out invoices, if you encounter a puper jam, the process can easily be restarted simply by entering the last correct invoice number.

By incorporating the available sorting options, the Order Entry reports can help you manage the order-fulfilling process. The Order Long lists all orders sorted by order number and displays summary order information. The Open Order report lists all orders by order type and status, as well as by customer, item, salesperson, and or der date. The Held Order report abones or der date.

noon.

Sakes Analysis report details all agross position seasons activity including quantity sold and gross profit percentage by order. Harmony's scring capability makes this report a powerful tool for honing your marketing and pricing strategies. A combination of an analysis of the profit of th

OTHER MODULES Among Harmany's accounting components are two of more-specialized interests. Client Accounting is designed for accountants and book keepers who provide write-up services for a large number of small clients. The Pyroll module calculates howly and salmed provide the provident of the provident of the provident of the provident provid

■ The flexible format W-2 feature that controls W-2 reporting is one of the latest enhancements made to the Payroll module.

W-2, as well as change predefined formats to accommodate unusual state items and federal changes.

The Payroll module includes a magnetic media feature that captures the W-2 data needed by the IRS and creates a floppy disk file that can then be edited and sent to the IRS. Within the Payroll module, the close-calendar-year feature allows flexible year ends by transferring the current year's files to a backup file that, in effect, resets the payroll for the new year. The manual has a very good checklist on closing procedures. Harmony also added a weeksworked tracking field to the employee master file, which is updated during each payroll run-good for workmen's compensation. But, since most companies find it easier to send their payroll work out to a payroll processing service bureau, this module will also have a limited user base.

Harmony offers three modules classified as productivity tools: an information Manager, a spreadsheer, and a word processer. The information Manager performs file management tasks, produces reports that draw on data from several



Or call 1-800-535-3232 ext. 30

for a free sample

pack or the dealer

nearest you.

modules at once, and functions as a primitive applications generator. It can also create application links that let you access fields in one file to update another file.

The spreadsheet and word processor are quite limited and can't compete feature-for-feature with popular standalone packages in the same price range. Their strength lies in the user interface that they share with the other Harmony modules (See "Fast, Flexible, and Forward-looking," PC Magazine, February 29, 1988. for a review of Harmony's \$99 Word Processing module.)

Two utilities, Backun/Restore and Import/Export, round out Harmony's list of available modules. Backup/Restore is an extension of the backup feature found in the System Manager. With it you can perform full, incremental, or module-specific backups and restores to and from preformatted disks. The verify and list features. respectively, check and log (to printer or file) the backup files. Though the utility operates marginally better than does DOS's BACKUP and RESTORE, a commercial package can do the job faster and more efficiently for about the same price.

Import/Export allows you to import or export Lotus 1-2-3 (Releases 1 and 2), Symphony, dBASE (all versions), ASCII, and .DIF files. Importing is a straightforward task. Exporting requires the creation of definition files in the Information Manager that interpret the Harmony file structures to match valid formats and file structures.

Open Systems provides its resellers with courses on Harmony installation-2 days for \$195 and 5 days for \$1,000. The company also provides qualified installers with materials for conducting user training. It offers phone support directly to users, although this runs \$3.95 a minute with a minimum charge of \$20 per call.

Harmony's sleek and consistent dataentry interface makes it a very appealing package, although a few of the program's structural limitations may render it unsuitable for some businesses. With a long-established vendor of PC software firmly behind it, there's little doubt that these accounting modules will do well in today's market .- G. William Dauphinais, Ray A. August, Edward M. Kneitel, and Timothy J. Lee

I KNOW THAT REPORT IS IN HERE SOMEWHERE

And GOfer is just the one to track it down. On a standard PC/AT, GOfer digs through files at a speed of over 1 Megabyte per minute. Most GOfer users find the information they need in less than 30 seconds.

A phrase, a fact, a note, a date. If you need it. GOfer finds it. Even among countless PC files, GOfer

software searches out the information you need with just one or two wor if the correct spelling slips your mind "The most exciting and essential add

on since Sidekick. A must for anyone who writes anything," says Tim Bajarin, columnist and commentator. Unlike other text-retrieval software, you won't spend hours indexing or converting files before you can start searching. Four simple keystrokes and GOfer searches

floppy and hard disks to uncover the text you need. Once GOfer finds a section of text, you can print it, create a new file, or copy and paste

you're currently working in. So if you need a certain document written to Bill Smith that mentions "insurance" and "third quarter profits just summon GOfer with one keystrol and give him the word. Within second that document will be at your fingerti

to the document

 Not copy protected Performs complex searches usi AND/OR/NOT and NEARBY

 Optional file compression feature allows you to fit more information on a hard disk. GOfer will search both compressed and non-compressed files. Works with other RAM resident

programs · Finds text in almost any PC file including Lotus, WordPerfect, WordStar, DisplayWrite, Microsoft Word, MultiMate

Ventura, PageMaker and dBase



Microlytics, Inc.	(716) 377-0130	In New York: No risk 30 d IBM PC Co	lay money back guarant mpatible [] 5¼* disk	ee □ 3%* disk
East Rochester, NY 14445	and Champion		o available for the Maci	ntosh
			- Discord	
□ Check □ COD (as	3d \$2.20)			
NAME				
COMPANY				
ADDRESS				
CITY		STATE	ZIP	
PHONE				

d Microlytics are trademarks of Microlytics, Inc. Other brand and product names are trademarks or registered demarks of their respective holders. All rights rese

CIRCLE S26 ON READER SERVICE CARD

PC MAGAZINE





Universal Printer Stand Save Space, Save Money...Only \$24.95 The new PS-1 Universal Printer Star from Curlis hads any Besides saving space, the PS-1 hads the printer and

printer, standard carriage or wide, saves valuable workstage, and costs only \$24,95. The PS-1 uses no more desktage space than the printer lisetif, and provides storage for input paper underneath the printer. Plus, a removable paper tray automatically stacks autour. pitch, to improve line of sight, sowing you neck and eye strain. Give yourself more room to work, and a system setup that's more efficient and organized: The PS-1 Universal Printer Stand from Curtis — the experts in accessories. #PS-1 Retail...\$24.95

Curtis products are available nationally fram leading Dealers, Distributors, and Retail Chains, in Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612

personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONI, L15 3C3, (416) 427-6612
 For the Curtis dealer nearest you call (603) 532-4123 Ext. 87

Fits all printers, standard carriage or wide.





Improves line of sight for portable camputers tool

Conveniently stores paper underneath, improves line of sight to printaut, removable paper tray catches and tolds printauts automatically.





Totally universal. Heavily constructed components, colored and fextured to match or complement all microcomputer systems.

CURTIS

30 Fitzgerald Drive, Jaffrey, NH 03452

A subsidiary of Rolodex Corporation
"Cuts Manufacturing Company Inc., 1988

An Insilco International Specialty Company

CIRCLE 472 ON READER SERVICE CARD

HELP FILE

Volume 7 Number 14 August 1988

BASICA 3.x Identifiers

This Help File lists standard identifiers for Advanced BASIC 3 x Some of these commands will not work in Cassette or Das BASIC, in the BASIC Compiler, or in previous versions of Advanced BASIC

e computers require their own versions of BASIC, e.g., GW BASIC. Most of the identifiers listed here will also correspond to these BASIC versions, but some may not

SYNTAX: BASICA (filename) (+input) (+) (+output)(F:files) ('S:bate) ('C:combutte [M:[max workspace)(,max blockstre]) ('D

e = BASIC program hie to load and run input - file or device for redirected input

files - number of files that can be open at once Default 3. Maximum is number specified in FE.E.S., line of CONFIG.SYS minus 4. Name - buffer size for random files Default 128 bytes Maxim nbuffer - receive buffer size for communications. Default 128 bytes

Maximum 32,767 bytes max workspace sets space allocated for BASIC data and stack segments.

max blocksize reserves space for assembly routines above highest location BASIC can address (85536) ID makes double-precision math functions resident

BASIC electifiers are variables functions statements and commands Variables are available for your examination and use. Functions return a value based on zero or more arguments. Statements and commands both perform an action, but in general you use statements within programs and commands in

BASIC Functions

PEN - Read light pen

SYNTAX PENimodel Result depends on mode

-1 (TRUE) if pen was down since last poll, 0 (FALSE) if not

1= last activated x coordinate
2= last activated y coordinate
3= -1 (TRUE) if pen down, 0 (FALSE) if up

4- last known valid x coordinat

5- last known valid y coordinate 6- last activated character row last known valid character row

last known valid character column

PLAY(r) — Number of notes in music buffer SYNTAX PLAY(dymmy)

PMAP — Map physical coordinates to world coordinates SYNTAX: PMAP(n, model)

n = x or y coordinate

Result depends on mode 0- map world a to physical a 1= map world y to physical y 2= map physical z to world z

3= map physical y to world y Color of point (graphics only)

SYNTAX POINTIAN x,y = coordinates of point

POINT - Current graphics coordinate

SYNTAX POINT(mode)
Result depends on mode 0- physical x coordinate 1- physical y coordinate

2+ world a coordinate 3- world y coordinate

SYNTAX POS(dummy)

TS - Rightmost bytenum characters of string SYNTAX RIGHTS(string,bytenum)

SYNTAX RND((model)

Result depends on mode. > 0- make next random number in sequence = 0= repeat last random number < 0= reseed random number generator

SCREEN - Read character from screen SYNTAX SCREEN(row.cof,z)

row - 1 15 m/- 1 40 or 1 80 z = if nonzero, returns attribute instead of character (text mode only)

SGN — Sign of number (-1, 0, or 1) SYNTAX: SGN(number)

SIN - Sine SYNTAX: StN(number)

SPACES — String of bytenum spaces SYNTAX: SPACES(bytenum)

SPC - Skip byterium spaces in PRINT

SYNTAX: PRINT SPC(bytenum)

SYNTAX SQR(number) STICK - Joystick coordinat

SYNTAX STICK/mode) Result depends on mode

0- x coordinate for joystick A 1- y coordinate for joystick A 2- x coordinate for joystick B

3- y coordinate for joystick B STR\$ -- Convert number to string SYNTAX: STR\$(number)

STRIG — Returns status of joystick buttons

SYNTAX STRIG(mode) Result depends on mode. 0--1 (TRUE) if button A1 pressed since last STRIG(0) call

O (FALSE) if not

(TRUE) if button A1 currently pressed. 0 (FALSE) if not

2- -1 (TRUE) if button B1 pressed STRIG(2) call, 0 (FALSE) if not 3= -1 (TRUE) if button B1 currently pressed.

0 (FALSE) if not 4=-1 (TRUE) if button A2 pressed since last

STRIG(4) call. 0 (FALSE) if not

5= -1 (TRUE) if button A2 currently pressed. O (FALSE) if not 6- -1 (TRUE) if button 62 pr STRIG(6) call 0 (FALSE) if not 7= -1 (TRUE) if button B2 currently pressed, 0

(FALSE) if not STRINGS — String of bytimum rep SYNTAX. STRINGS(bytenum.m)

-or- STRING\$(bytenum.string)

m - ASCII code of character (0 255) to repeat string - repeat first character of string

TAB — Tab to position in SYNTAX PRINT TAB(it) # - tab column (1 255)

TAN — Tangent SYNTAX, TAN(number)

TIMER — Number of seconds since midnight SYNTAX TIMER

USR -- Calls assembly language subroutine

SYNTAX USR [rij.arg) on (rejump)

= number of USR function defined with DEF USR statement (0.9) Default 0

arg = argument to USR function

VAL - Convert string to number SYNTAX. VAL (string) SYNTAX VARPTRS (string)

VARPTR — Offset of numeric variable in current segment SYNTAX VARPTRinumper VARPTR\$ — Offset of string variable in current segment

-Net J. Rubenking



Curtis Clip, Only \$6.95 Improve Data Entry, Reduce Eye Fatigue

The new Curtis Clip positions copy perfectly so your eyes no longer have to refocus from desktop to monitor. Holds any standard paper, uses no desktop space! Plus, the Curtis Clip swings out of the way when not in use.

Safe non-magnetic, reinforced construction. Fits all mon-itors. Ready to use, includes VELCRO® Brand fasteners. The new Curits Cilp—" will change the way you work with computers forever. #CC-4Retail...Only \$6.95

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains. In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Alax, ONT, L15 3C3, (416) 427-6612

For the Curtis dealer nearest you call (603) 532-4123 Ext. 87

cludes ready to use ELCRO® Brand fasteners







Reduce eye fatigue; no more refocusing from desidoo to monitor. Speeds





itches for right or

30 Fitzgerald Drive, Jaffrey, NH 03452

Made in U.S.A A subsidiary of Rojodex Corporation

Lifetime Warranty

* VEICRO is a registered trademark of VEICRO

PRODUCTIVITY

■ PC LAB NOTES: C LANGUAGE ■ RICHARD HALE SHAW

WRITING OPTIMAL C: PART 1

Your program's size and speed are ultimately its measure. Here are some proven techniques to help C programmers optimize the performance of their routines.

The quality of C complers is continually improving, but the ultimate responsibility for how well your program runs is still yours. If you've ever written a 15-line C program that crawled rather than ran, or compiled into a 10K executable, or mushroomed into a 20K executable, or mushroomed into a 20K increases, may have fell you wondering why monestering the fell you wondering why the control of the program o

In Part 11 II discuss the reasons for opmining C, what you can do to deflate the size of your programs, which parts of a program to compress, and how to find them. In Part 2, next issue, 11 incover techniques for realizing optimal speed from your programs. The techniques 1 demonor high-level languages but the footman optimized the programs of the programs. The same for this purpose that you own with Microsoft C 5.0, QuickCf 10, or Borland's Turbo C 1.0, fough many other C compilers also support the features mentioned here.

WHY OPTIMIZE, AND WHY C? Why should you bother to optimize code written in C—a language traditionally accorded high marks for being capable of producing efficient programs? I can give you three good reasons: speed, speed, and more speed. There just isn't a program that runs fast enough. Period. Nor is there a profiss enough. Period. Nor is there a pro-

gram that's small enough.

If you're writing end-user applications, you can be sure of two things: that there's no end to the number of features your boss, client, or marketplace will later demand,

PRODUCTIVITY INDEX

PC LAB NOTES Tips and techniques to help you write

the most efficient C code.
UTILITIES
RAMVIEW displays a window into
RAM while your programs stay loaded.

ENVIRONMENTS
How to interface keyboard and mouse input with the Presentation Manager.
POWER PROGRAMMING
A C program that stores incomplete

filenames in fully qualified form.

SPREADSHEET CLINIC

A mysterious, undocumented 1-2-3
macro command: a bug in Quattro.

USER-TO-USER
A batch file method for returning to the directory where you started.
POWER USER
Shortening Clipper link times; sorting WardPerfect records by date.

LANGUAGES
Changing colors in Turbo Pascal, and a
"bouncing ball" menu in BASIC.
PC TUTOR

Passing parameters from batch files to BASIC programs using DOS. CONNECTIVITY CLINIC Monitoring communications between applications and NetBIOS services. and that the smaller the code, the easier it will be to add new features. If you're writing RAM-resident utilities, you must start with the realization that if they're too big they'll have no utility at all. If you're programming for Windows, your program must be small enough to coexist with others, and if it doesn't run efficiently it'll bring Windows to its knees. If your graphics-generating routines tie up the processor in a workstation application, your customers will shortly be shopping elsewhere. Response time and size are no less critical if you're writing device drivers or operating system utilities. And no matter how efficient OS/2's virtual scement swapping is, small programs will get swapped faster than big ones.

Although program efficiency might seem to dictate writing all code in assembler, sometimes you must also consider the question of programmer efficiency. Even grizzed assembly language programmers will admit that the decision to trade off some speed and size for the structure, contoul, and maintainability of a high-level language (HLL) can be a good one. If you present a few ground and the program and the ground and the program and the program and the trade of the program and the program and the minimaterial program assembler.

Among high-level languages, C is still my choice for the reasons it first attracted me: its efficient code and portability to other operating systems and environments. Written correctly, C can be a highly structured, controlled programming language that can hidd be unnecessary details of one part of a program from another. The C pro-

■ PC LAB NOTES

grammer can choose to access the hardware directly, can manipulate data at the bit level, and, in some implementations, can control the contents of the machine registers themselves. Thus you can retain the advantages of an HLL and gain those of assembler.

Tom Plan, author of Efficient C (Plan-Hall, 1985), highly characterise C as a user-optimizable language. It's the C programmer's responsibility to tailor and structure the code and ensure its efficiency. To play his role as optimizer, the programmer must have the necessary tools and techniques, and Plam's book is an excellent source from which I have drawn heavily for this stricle.

OPTIMIZING FOR SIZE To control the size of a C program, it's essential that the you prepare for problems before they arise. As you pleany corporation, to return the wind the problems before they arise. As you plan your program, try to extinate which parts will be the largest and will therefore require the most optimization. By familiarizing yourself with the components of a C program, and by measuring and estimating the size of the code and data, you can concentrate your optimization efforts on the areas that will need

them the most.

C programs are built of four space-con-

suming components: code, data, heap, and stack. Code—also known as text—is the actual machine code generated by the compiler and linker. The data component consists of all global and static variables

■ If your compiler doesn't offer a way to measure the available heap and stack space at runtime, there's no easy way to measure the requirements other than to run the program.

and of constant data such as string constants. These are fixed at runtime.

The remaining components, the heap and the stack, can change during program execution, although a fixed amount of space is initially allotted to each of them. The heap is the memory region in which all dynamically allocated variables reside, while the stack is used for allocating local variables, passing function arguments, and storing function return addresses.

The DÖS linker provides a way to measure and examine the space requirements of the code and data area. As shown by Figure 1, the map produced by the linker shows the size of each function and each of the global and static variables. It also references the routines that are used internally by the mutime library.

Some compilers, like Microsoft C, of er a means of measuring the available for a means of measuring the available heap and stack space at untime. These are explained in more detail in the compiler manual, but I'll mention them briefly here. The function_menavl() returns the function_menavl() returns the order of bytes available for dynamic memory allocation by calls to an all oct(). Stack space can be checked at any time with the stackwastl() function.

If your compiler doesn't offer such facilities, there's no easy way to measure the heap or stack requirements of a program other than by running it. Since the heap space is dynamically allocated, you can, through successive compilations, reduce it in a controlled fashion until an error occurs. Plum suggests declaring a global ob-

iect, such as an array, and gradually in-

creasing its size until the heap space has

Start Sto	P Length Name	Class	0000:0299	brk	
88888H 811	70H 81171H TEXT	CODE	8989:82A5	sbrk	
81188H 815	A9H ##42AH DATA	DATA	8888:82D2	exit	
815AAH 815	ADH ##### EMUSEG	DATA	0000/0301	fflush	
015AEH 015	AFH 00002H CRTSEG	DATA	0000:0375	free	
815B8H 815	B1H 00002H CVTSEG	DATA	8888:845F	fseek	
815B2H 815	B7H 00006H SCNSEG	DATA	8888:84CE	ftell	
@15B8H @35	FFH #2#48H BSS	BSS	8888:852B	IOERROR	
83688H #36	BOH BOSOOH BSSEND	BSSEND	8988:8564	isatty	
83688H #36	TH SESSEH STACK	STACK	0000:057A	lseek	
	_		9999:85A3	LONGTOA	
Address	Publics by Value		0000:0620	Itoa	
	· ·		9989:8647	ultoa	
8888:8888	Abs cvtfak		8888:8661	_ltoa	
8888:8115	-exit		9888:8686	malloc	
0000:0171	restorezero	3	9989:8722	printf	
8988:818D	abort		0000:0739	fputc	
8888:81A3	DGROUP@		8888:882C	fputc	
8888:81A5	main		8888:8889	fputchar	
0000:0223	atexit		8999:989D	FPUTN	
8888:8247	brk		8888:8915	REALCYT	
8888:8267	sbrk				(continues)

Figure 1: Linkers provide a means of measuring and examining the space requirements of the code and data areas. The linker map shown here (from the Turbo C linker) shows the contents of the code and data areas for the program found in Figure 3.

8888:891F	setargy	0118:0092	heapbase
8888:888A	setenvp	8118:8896	brklvl
8888: 8A54	setybuf	#118:##9A	heaptop
8888:884C	VPRINTER	#118:#17E	atexitont
8868:8FED	Write	#118:#1D8	exitbuf
8888:118C	write	#118:#1DA	exitfopen
0000:1150	-xfflush	#118:#1DC	exitopen
8118:8874	ZeroDivVector	9118:91DE	streams
8118:8878	argo	0118:031E	openfd
8118:887A	_argv	@118:@346	heaplen
8118:807C	environ	0118:0348	doserrno
8118:887E	enving	#118:#34A	dosErrorToSV
8118:8888	envseq	#118:#3A8	Allocp
8118:8882	envSize	#118:#3AC	stdinStarted
9118:8884	— psp	#118:#3AE	stdoutStarted
8118:8886	version	#118:#3B#	stklen
#118:##86	version	#118:#43F	RealCytVector
Ø118:ØØ87	osmajor _osminor	#118:#432	ScanTodVector
8118:8888	errno	8118:8438	records
8118:888A	8887	8118:2448	atexittbl
8118:888C	heapbase		
9118:998E	brklvl	Program entry	point at #888:8888
9118:998E	beanton	ogram entry	

been exhausted, as shown in Figure 2. You can try the same experiment with a local variable to test stack availability.

ESTEMATING SPACE When you can't measure the exact amount of memory space required, you must often guess. An accurate estimate can help you choose among optimization techniques, though each component of your program has to be evaluated independently.

For instance, you can measure the size of each function, calculate an average of the amount of code required for each function call, and count the number of function calls in a program. Unfortunately, this approach becomes less procies as the code increases in size. I've had reasonable success using Tom Plum's simple rule that each page of source code will produce 250 bytes of actual code.

Fortunately, data requirements are a lifte easier to estimate. By writing a program using the TEST.C program shown in Figure 3 sa an example, you can generate are complex data types and use the \$12±0.ft operator to determine their space requirments. This allows you to get an accurate measure of the total data overhead before the program has been written.

The heap and stack requirements are difficult to measure, but they are even more difficult to estimate. One approach is

to add up the sizes of dynamically altocadi eines and multiply them by the number of times cach is altocated. However, this still gives you only a rough "guestimat." of heap usage, since the memory altocation strategy used by malloc[1] varies from one complete of another and involves additional overhoad not provide the still give the still give the there's no way allocate memory internally, that throwing two custimates.

off even further.

A similar problem occurs with the stack. You can count up the local variables used in the deepest hierarchies of function

#define ARRAY SIZE 38888

calls. Add to that the stack space used by the functions themselves. This will give you a reasonable minimum for stack requirements, but it does not take into account the stack overhead of library functions (which may call other internal routines), and it may be completely out of line if you have any recursive calls in your program.

(Figure I ends)

line if you have any recursive calls in your program.

Once you do have an estimate for each component, put them together and add some margin for the code—it's usually underestimated. If you anticipate the space requirements of each component, you'll have some advance notice of problems be-

fore they become unwieldy.

```
Use values from 1 to 65534 for the small and medium
models. Large model programs should have one or more
large arrays with values of 65534 for all but the last which
should be from 1 to 65534. If the 'hage' data type is
available, use it and set the value as high as possible.
```

```
char large_array[ARRAY_SIZE];
main()
{
    /* replace this dummy with your program here */
}
```

Figure 2: By increasing the size of a global variable during successive compilations, you can eventually discover the minimum heap required by a program. You can do the same with a local variable.

```
) SALES:
typedef struct _employees
    char empl fname[15];
                                                         typedef union records
    cher empl_init[3];
cher empl_lname[15];
                                                             EMPLOYEES
                                                                           employees
    unsigned empl_no;
                                                             CLIENTS
                                                                           clients;
    char empl_ssno[12];
                                                             CATEG
                                                                           seles:
NPLOYEES:
                                                         ) RECORDS:
typedef struct clients
                                                         #define MAXRECORDS 188
    char
             client_name[38];
                                                         RECORDS records [ MAXRECORDS ];
             client_eddress(28):
    char
    cher
             client_city[15];
                                                         main()
    cher
             client_stete[3];
client_sip[18];
    char
                                                             printf("Dete type:
                                                                                        Size (in bytes):\n"):
    long
             client_no;
                                                             printfi-
                                                                       Char
                                                                                         %d\n", sizeof(cher));
} CLIENTS;
                                                             printf("
                                                                                         %d\n", sizeof(int));
                                                             printf(*
                                                                        Long
                                                                                         %d\n", sizeof(long));
typedef struct _seles
                                                             printf("
                                                                       Floet
                                                                                         %d\n", sizeof(floet));
                                                             printf(" Double
                                                                                         %d\n=,sizeof(double));
    long
             seles_no;
                                                             printf("EMPLOYEES
                                                                                         %d\n*, sizeof(EMPLOTEES))
             seles dete;
seles invno;
seles client no;
    long
                                                             printf(" CLIENTS
                                                                                         %d\n", sizeof(CLIENTS));
    long
                                                             printf(" SALES
                                                                                         %d\n", sizeof(SALES));
    long
                                                             printf( RECORDS
                                                                                         %d\n", sizeof(RECORDS));
                 seles emplno;
    unsigned
```

Figure 3: A small program can be written, using the example above, to determine the space required by different data objects.

MODELS AND OVERLAYS As you measure and entitate component six out an begin to plan which memory model to select. Memory models were necessary because of the segmented architecture of the segmented architecture of the mine 1808 series family to finite processors. They are not a major concern in linear architecture entitled with the series of the segmented architecture or the series family of microprocessors. They are not a major concern in linear architecture environments such as the Motorola 68000. Since the 64K segment is a way of life for key, bowever, a brief description of the standard C memory models sin noter.

The memory model you choose will have a significant impact on all four of the components of a C program: code, data, heap, and stack. While most contemporary C compilers support small, medium, and large memory models, some, like Microsoft C and Turbo C, offer additional variants.

The mull model consists of two principle segments, each of which can be up to 64K in size. One of these is for code and the other is for data, heap, and stack combined. This is generally the most efficient model to use, since all of the functions and data objects can be referenced as 2-byte addresses; (an unsigned integer value ranging from 0 to 65.53) in a single segment. Turbo C supports a "tiny" model in which all components must fit into a single 64K. segment, and the executable program is generated as a .COM file. When appropriate, this offers an additional advantage in speed and size.

speed and size.

The medium model is intended for programs with more than 64K of code. While

Memory models are necessary because of the

segmented architecture of the Intel 8088 series family of processors.

all data, plus the heap and the stack components, are still confirmed to 6K, the code size is almost unlimited and can consist of multiple segments up to 64K each. Code addresses require 4 bytes in the medium model (to store both a segment and an offsest), and all references to the code—function calls, function pointers and return addresses—will require 4 bytes instead of 2. This can significantly slow down a program; you can see and feet the difference in performance when a small model program is recompiled and run under the medium model. Figure 4 shows the differences in program size you can expect when using different memory models for the same pro-

The large memory model allows multiple code and data segments, any of which can extend up to 64K. Since all code and data items must be referenced as 4-byte addresses, the size of the program usually increases significantly (from 1½ to 2 times) when you move to the large model. And since pointers and data addresses are large

er, performance is degraded. Obviously, you should always choose the smallest possible model. But it's not component (usually the code) is jet sign all the tob lig to fit within a more efficient memory model. On a laternative to consider when code size is a problem is the use of corrigo. Overlays is lower program swap memory location into the program's sough memory location into the program's sough source as needed. This technique often lets you stay within the confines of a smaller memory model than you could if all of the

code were present in memory at one time.
There are, however, some disadvantages to using overlays. First, you may

SCSystems 1-800-669-9933

Serving Computer Buyers For Eight Years

Para Asistirle En Espanol Llame Al Tel 1-800-842-1777

InComm 1200B Int Modem \$62

Samsung 14" RGB Monitor \$215 640 x 230

Color' **Graphics Card** Parallel Printer Port

w/Software

.51 Dot Pitch

HARD	WARE	SOFT	WARE
ACCESSORIES	MODEMS	ACCOUNTING	INTEGRATED
CopylIPC Brd Deluxe \$ 99 Masterpiece + 95	Hayes 1200	DacEasy \$ 54 Dollars & Sense 95 Managing Your \$ 119	Ability Plus \$ 139 First Choice 79
COMPUTERS	Incomm RPC2400 147		LANGUAGES
NEC Multispeed	Incomm T1200 76 Incomm T2400 167 Incomm T2400EC 224	COMMUNICATION Carbon Copy Plus \$ 106 CrossTalk XVI 89	MS QuickBasie \$ 60 MS Quick C 60 Turbo Basie 59
Toshiba T-1100 S/Twist 1455 T-3100/20 3140	MONITORS Amdek 410	CrossTalk 4 115 PC Anywhere 57 SmartCom II 82	Turbo C 59 Turbo Prolog 59
BOARDS	Princeton MAX15 Call Samsung RGB. 215	DATABASE	SPREADSHEETS Letus 123 \$ Call
AST Adv Prem 1mb \$ 419 AST 6Pac Prem 1mb \$ 25 AST Sixpac 115	Samsung Amber 82	Clipper \$ 370 Data Perfect 255 DBase III 379	Pian Perfect 192 Quattro 150 Surpass 329
Hercules Grph + 182 Intel Above 286 Call	3C501 ELink	DBXL Diamond	UTILITIES
EGA BOARDS ATI EGAWonder \$ 175	3C503 ELink II	Paradox 2.0 Call Q and A 188 Relate & Report 100	CopylIPC \$ 18 Desqview 71 Dast 48
Genoa SuperHiRes+ 195 Orchid Designer 272	Citizen	DESKTOP PUBLISHERS	Fastback Plus 88 Formtool 52
Paradise 480 155 Paradise VGA +XT 259 Paradise VGA Prof 385 Vega VGA 269	120D \$ Call 180D 199 MSP-15E 319 MSP-40 285	Pagernaker \$ Call PFS First Pub 55 Ventura 495	Mace 48 Norton Advanced 72 PC Tools Deluxe 36 Sidekick Plus 119
	C.1toh	GRAPHICS	Sideways Print
EGA MONITORS	ProWriter C715	Chartmaster 8 199 Generic Cad 3.0 51	WORD PROCESSING
Princeton U/Syne \$ 519 NEC Multisyne 2 599 Samsung 359	StarWriter D10	Printshop 33 Signmaster Call	Word Perfect 5.0 \$ 219 Wordstar ProPack Call Wordstar 2000 Call
HARD DRIVES	P2200	Master Cord No Cha	
Seagate 125 w/cont \$ 321 Seagate 138 w/cont 411	Okidata Call on all models.	Masterca	rd or Visa
Sengate 138 w/cont	Panasonic 1091/M2 179 1091/M2 199	Call For Iten	ns Not Listed
KEYBOARDS Keytmains 5151 \$ 127	1092I Call Star NX-1000 179	SCS	stems

3000 Mariposa Hwy, Ste. B, Nogales, AZ 85621

Order Line 800-669-9933 Espanol 800-842-1777 Status Line 602-275-1395 FAX No. 602-273-0043 Order Line for Europe & Mexico 602-287-5347

NX-1000 Color Call

NO OTHER DISPLAY



GIVES YOU SO MUCH FOR SO LITTLE.

Introducing the \$999, suggested retail price, Cornerstone SinglePage Display System for PCs. Now you can see the whole page at once. And get the whole story.

For \$999 you get a full page vertical display system including a 15 anti-glare monitor with 768 x 1008 of flicker-free resolution, the display controller board with built-in Hercules graphics adapter emulation, and a tilt-and-swivel base. So you can stop scrolling around and get down to work.

See all your computer can offer.

Computers are great productivity enhancers. But they can also be very frustrating when you always have to print a page in order to see what it looks like

We've put an end to that. The Cornerstone SinglePage Display System gives you a full page at a time. On a screen big and bright enough that you can read even the fine print. So you can see what you're doing—and how you're doing—before you print.

Now you can have this display system for half the price of a laser printer. And we think that once you try it, you'll find the Cornerstone SinglePage Display System is just as invaluable as that printer.

See what \$999 buys you today.

The reason we can offer you the SinglePage Page Display System for so little is that we design our own electronics. Our Large-Scale Integration (U.Sl) electronics use the fastest logic currently available. So you get the best products at the lowest prices.

You see, we're the Page Display people. We build nothing but Page Display systems for the PC and Mac. So we spend our time looking at how you look at your computer. That's why our display systems support all the popular PC software solutions level. Ventura Publisher, Lotus 1-2-3, Word Perfect and Microsoft Windows applications such as Adus Page-Maker It's also why we offer our optional four-level grayscale and with every system we bundle fonts to give you clean, crisp, smooth text. And then we provide toil-free technical support and warranty everything for at least a year.

That way you get the most out of your computer. And the most for just \$999.

Software Support					
User Environments:	Microsoft Window DRI GEM	Halo'88 SUN Ne	ws		
Desktop Publishing	Word Processing	CAD/CAM	Spreadsheeb		
PageMaker Vernura Publisher Publishers Paintbrush	WordPerfect WordStar GEMwrite	AutoCAD AutoShade CADKEY	Excel Letus 1-2-3 Symphony		
and	many more full-pag	e applications			

See two at once.

If you prefer to deal with two pages at a time, the Cornerstone DualPage Display System offers you ultra-fine resolution 1600 x 1280 in a 19' display system. So you can work on two pages side-by-side, instead of scrolling back and forth.

See us in action.

Whether you're using a PC, Mac II or Mac SE, see what Cornerstone's SinglePage and DualPage Display Systems can do for your computer. Call us at 8000 237-4565 for

the dealer nearest you.

We're Cornerstone Technology, the
Page Display people, And we think it's time

your computer CORNERSTONE got the

San Jose, CA 95131-1721 (408) 279-1600

An inside look at the best 386 value around.



The more you look into 386 compatibles, the more you realize that well thought-out design innovations (that really work) are few and far between. That's why our engineers set out to design the

GV-386. They realized they could unlock more of the chip's potential, if only they could speed up data retrieval, without affecting system reliability.

INNER POWER

Here's how they did it: a high-speed RAM cache circuit-a full 64K of superfast memory-that puts your most fre-GV-386 quently accessed data right at your Specifications fingertips. If you're ever involved in

processing complex databases, long spreadsheets, or detailed engineering drawings, you'll see the value of this innovation in a second...literally. Best of all, the cache circuit

actually makes the GV-386 more reliable than other high-speed machines. by sparing integrated circuits from harsh overloading.

QUALITY THROUGHOUT

Of course, our most important criterion when designing our super compatible wasn't speed-it was quality. Take a look inside the GV-386 and you'll see it everywhere: from the highest quality components available to the intelligent use of special CMOS RAM to store system set-up information. On the outside, the fit and finish of the GV-386 would make Big Blue green. Even the user's manual has impressed users and reviewers alike.

We'd like to tell you more about what went into the GV-386. Give us a call and we'll give you the whole story. We'll also tell you about our exclusive 30-Day Compatibility Guarantee, our full One-Year Warranty and our tollfree support service.

The GV-386 from PC Designs. With design innovations this advanced, at this price, it's an open and shut case.

Call us now at 1-800-32-BIT PC

1800-322-48721 2500 N. Homlock Orcio, Broken Arrow, OK 24012 . 918-251-5550 (Fax 918-25)-7057) 19 Rector Street State 2705 New York NY 10006

+ 212-514-7280 (Fax 212-797-3973)

Our BBS is on-line 24 hours Call The Soft Stop at 918-252-9137

Prices subject to change

at \$2,750; 16MHz systems CIRCLE 372 ON READER SERVICE CARD

□ Available with 16MHz

□ 64K Cache (keyboard)

☐ IMB RAM on-board.

expandable to 4MB

□ Socketed for 80287 or

□ I/O Bus runs at 8MHz for hardware compatibility Six 16-bit slots: Two 8-bit

□ Price: 20MHz systems start

as low as \$2,375

or 20MHz CPU

☐ Zero Wait States

enabledi

■ PC LAB NOTES

need to restructure your program so that routines used in different overlays are always present in the "root" or nonswappable part of the program. This means that a function in one overlay may not be able to call a function in another overlay. Seeond, if the overlay is stored in a disk file, there is some overhead involved in loading

it. (A RAMdisk can reduce this problem.)
On the other hand, if the overlays are stored in memory (and simply swapped in and out of the code segment), they may take up so much RAM that other pro-

grams, such as RAM-resident utilities, may not be able to be loaded at the same time.

PC Magazine (Sep. 29, 1987)

If data size is a factor, Microsoft C allows a huge data type: a data object over

The TEST.C Program Compiled Under Different Memory Models

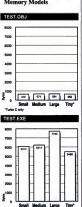


Figure 4: Recompiling the program in Figure 3 under various memory models shows the difference in the size of the program. However, the change is most profound under the large model.



"The (Chicony) keyboard achieves a touch that is the closest to the official IBM feel..."

Your computer system isn't period! If your keyboard doesn't feel right.
Chicony, see of the worlf's largust keyboard monufacturers, afters you both 84- key and
101-key keyboards which are fully 16M XT, AT, PS/2, 386 and Novell compatible with
supporter 18M-like feach.

All Chicony keyboards use genuine mechanical key switch technology, not

nabber or sponge built with springs to simulate mechanical switches. The provides you with an IBM-like "click" facilitie touch or a sitent facilit touch featuring a soutputed Are profile design, double-injected key caps with identifying alphanumenics modied in place, not painted on, for extended life, and a host of other features. China keyboards are the right choice for your system.

To feel the difference that a Chicony keyboard can make, contact your nearest Chicony dealer or call us.



Chicony America, Inc. 1641 W. Collins Ave. Oronge, CA 92667

Orange, CA 92667 Tel: (714) 771-6151 Fax: (714) 771-3246

Eastern Office: 1637 Stelton Rd., Suite 6 Piscataway, NJ 08854 Tel: (201) 819-8300 Fax: (201)819-8303

IBM, XT, AT, PS/2 are trademarks of International Business Machines Corp.

■ PC LAB NOTES

64K in size, which can be accessed from small and medium model programs. So don't limit yourself to one approach when choosing a memory model.

SHRINKING DATA SIZE You can shrink the data overhead of your program by using smaller data types. Use a character variable in the place of an integer variable when possible, for example. If the values in your data fall into the range of characters (-127 to 127 signed, 0 to 255 unsigned), a char designation is sufficient. The same is true of ints, which range from -32767 to 32767 signed and from 0 to 65535 unsigned. These can often be used in the place of a long. Using smaller data types for local variables will also reduce your program's stack overhead.

Unfortunately, while using chars instead of ints can shrink the data in your program, character-to-integer conversion by the processor may slow it down some and add to the code. Since the architecture of the 8088 is based on 16-bit words, 8-bit objects must be converted to 16 bits for processing. With heavily accessed data, the ensuing slowdown in program performance can be very apparent.

You can also compact your data to fit a smaller data type by modifying the values

as they go in and out of storage. This is an especially useful technique if the values are too large to fit in a smaller data type but are limited in range. If most of the values fall into the range of a smaller data type but a few do not, work out a means of storing

the few exceptions. When you are using a character or integer array to track a wide range of data, consider using a bitmap instead. A bitmap is an array of some larger C data type (int or unsigned char), whose individual bits are used to track information. The phrase "bitmapped display," used in connection with programs like Windows, refers to the use of bitmaps to track the value of each nixel in the video display.

While a more detailed discussion is given in "Compressing with Bitmaps" (Languages, PC Magazine, April 26, 1988), you should note that an array of 32,000 unsigned chars can store a bitmap of over 250,000 bits, compressing data considerably. And though the overhead of turning the bits on and off is greater than that of setting the value of the individual bytes, C's bitwise operators (&. 1, >>. <<, etc.) more than lend themselves to the job. The technique of manipulating the individual bits in a bitmap is illustrated in

Figure 5. You can save space by using C's bitfields in place of conventional structure or union members. This is advantageous if you have a number of fields that are to be used as Booleans (ON or OFF), or that have a limited value range. For instance, a value from 0 to 15 can be stored in 4 bits so a bit-field 4 bits wide could be used in place of a char. And while a bit-field such as this is accessed as a conventional structure or union member, it consumes only the number of bits specified in its definition as shown in Figure 6

Unions can also be used to save space when you are using a structure with a large number of fields in which only a few fields are used by the program at a time. The structures can be divided into smaller structures that contain fields needed at the same time. Then all of the structures can be placed in a union.

Remember that a union is an aggregate data type whose size is the size of its largest single component. You can access the memory occupied by a union as if it contained different data types. You'll save snace by referencing only the structure you need at the time you need it, thus allowing you to superimpose the same structures on the same memory location. The space saving becomes more obvious if you need to maintain an array of these structures and you access each member of the array as a

ettre struct

cher filename[88]; struct sttrs sttribute;
} files[MAXFILES];

}; struct _files

uneigned reserved : 2; uneigned is_archivable : 1;

unsigned is dir : 1; unsigned is lebel : 1; unsigned is system : 1; unsigned is hidden : 1;

uneigned is readonly : 1;

```
/* setbit() - turn ON bit n in bitmap
void setbit(unsigned char *bitmap, unsigned n)
   bitmap[n/8] |= (1 << (n % 8));
    /* resetbit() - turn OFF bit n in bitmap */
void resetbit(unsigned char *bitmap, unsigned n)
   bitmap[n/8] &= (~(1 << (n % 8)));
    /* isbitset() - returns TRUE if bit n is ON, else FALSE */
int isbitset(unsigned char *bitmap, unsigned n)
   return (bitmap[n/8] & (1 << (n % 8)));
    /***** macro versions *********/
#define setbit(bitmap,n)
                            (bitmap|n/8| |= (1 << (n % 8)))
#define resetbit(bitmap,n)
                              (bitmap|n/8) 4= (~(1 << (n % 8))))
```

Figure 6: C's bit-field capability can save space in structures or unions. Here, a structure can be ased to reference the bits of the DOS file attribute byte as if they were separate elements

if(files(i).ettribute.is_resdonly) printf("\nFile is READ ONLY

#define isbitset(bitmap,n) ((bitmap|n/8| & (1 << (n % 8)))) Figure 5: These functions and macros can be used to manipulate the individual bits in a bitmap While the functions generate less code, they are inherently slower than their macro counterparts. of the structure.

Ahead of its kind.



Introducing the Panasonic* Laser Partner*

Il pages per minute (all originals, text): Two paper cassettes - Optional envelope cassette - Il built-in fonts.

Call for information or dealers: 1-800-PTC-8086.

Panasonic Office Automation

CIRCLE 119 ON READER SERVICE CARD

different structure, as shown in Figure 7

If several different structures are used in different parts of the same program, you may allocate them dynamically, as needed and then deallocate them when finished. This reduces the total memory overhead of the program; you're removing globals from the data area, and they will never exist in the heap at the same time. This allows different structures to share the same physical memory.

Linked lists of structures allow you to add and remove members to and from a list dynamically. However, there is some overhead involved (both time and space) in maintaining the links from one member to the next, as well as in allocating and deallocating memory. So whenever possible, use an array of structures instead. If you need to add and remove structures from the list, use one of the fields as an index to the next (or previous) member, as in Figure 8. The same member can be used to indicate whether a structure is inactive (removed from the list). If size of the array has to vary radically, you can allocate the entire array dynamically and use realloc() to increase its size when needed. Figure 9 provides an example of this technique.

Most C compilers and linkers let you set the stack size of your program, and shrinking the size of the stack will make more memory available for dynamic allocation and global data. Unfortunately, however, stack growth is the bane of those who write recursive routines. As illustrated in Figure 10, you can reduce stack dependence in recursive functions by using static variables in the place of local variables or function arguments that do not have to be unique to each recursion of the function

REDUCING CODE SIZE While there are a number of ways to send C code to the diet farm, you should start with specific routines that can be singled out as clearly overweight. With each function you select, ask: Is there another way to do this? Can another algorithm be selected? Is the routine too general? Will the program's context restrict the function to some specific cases, and, if so, can it be trimmed down to handle only those cases?

Then perform this surgery in a broad fashion on the program itself. Library

```
void add employee(int offset, char *fname, char *init,
   char *lname, unsigned no, char *ssn)
    strcpy(records[offset].employees.empl fname,fname);
    strcpy(records[offset].employees.empl init,init);
    strcpy(records[offset].employees.empl lname,lname);
    records [offset].employees.empl no = no:
void add sales(int offset, long no, long date, long invno,
    long client_no,unsigned emplno)
    records offset1.sales.sales no = no:
    records[offset].sales.sales_date = date;
    records[offset].sales.sales_invno = invno;
    records[offset].sales.sales client no = client no;
    records[offset].sales.sales emplno = emplno;
```

types in the same space. The array of unions in Figure 2 is used in one function to store one type of structure, and in another function to store a different structure. This scheme assumes that the same

```
Figure 7: By using several structures in a union, you can superimpose different aggregate data
array member will not be used for two different purposes at the same time.
  struct list
      int
                  next:
      int
                  row:
      int
                  column;
      woid
               *video region;
      int
                  region_size;
  #define LIST MEMBERS 2#
  struct list list[LIST MEMBERS];
  int remove from list(int offset)
      int
      for(i = 0; i < LIST MEMBERS; i++)
          if(list[i].next == offset)
               list[i].next = list[offset].next;
               list[offset].next = #xffff;
               if(list(offset).video region)
                   free(list[offset].video region);
               return TRUE;
      return FALSE;
      if(remove from list(5))
          printf("\nList me
                               ber 5 successfully removed from list"):
```

Figure 8: Using an array of structures in the place of a linked list can save time and space. Here, a member of the structure serves as an index to the next list member. When the structure has been removed from the list, the member is set to 0xffff.

SPEND 200 SECONDS WITH AN IZE USER.

When a new kind of software is released, some explaining needs to be done. In the case of IZE, a quick demonstration is the best explanation. Picture an executive opening her IZE and requesting an outline of letters re-









sponding to inquiries for information written to contacts in California. Based on the request, her complete collection of letters is searched. IZE finds 190 information response letters to addressees in





The Charles of the Ch

The first term of the control of the

A call brings a request for some sales projections. IZE will find them fast even in other applications.

The executive simply to links discovered from IZE to a spreadsheet document. The fugues are found and the cuestion answered. Returning to the cuestion in answered. Returning to the cuestion in the cuestion answered.

look, prints it, and moves on.

If these 3 minutes and 20 seconds of productivity are something you'd like to see more of, don't waste time before taking the next step.

Visit a dealer for a longer demonstration or phone us at 608-273-6000 and realize the power of IZE.

IZE MAKES INFORMATION MANAGEABLE.



1088 Penot, Ioc. All Rights Reserved. 22 and Penoth are regelered trademarks of Penoth Inc. 465 Science D Modeson, WI 52711 U.S.A. Specifications subject to change without notice Patients Fending CIRCLE 366 ON READER SERVICE CARD.



Now, the creation of an doesn't require so

Legend gives you wind processing draphics

Legend gives you word processing, graphics and desktop publishing in one comprehensive program.

It used to take a miracle to get valuable documents produced. Moving in and out of different programs for different functions was no small feat.

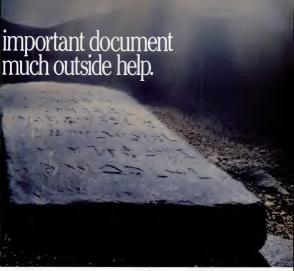
But now there's Legend from NBI. The answer to all your prayers for a simpler way to produce a multitude of documents.

Simply slip Legend into your IBM*286/386 Personal Computer or compatible equipped with Microsoft Windows and you can process works, create graphics and lay out pages. All without leaving the comforts of one extremely comprehensive software program. And all for nothing more than you would

expect to pay for a desktop publishing package. The competition covets us.

Unlike conventional word processing programs, Legard gives you the power to command more attention. You can blend text, graphics and tables into your document to get your points across with impact. And if you ever need to make a revision, every component will adjust to the change. That's versatility and flexibility you can worship.

Even desktop publishing systems pale by comparison. Because they're always at a loss for words. In fact, you usually have to import most of your text into your document. And heaven help you if you need to make revisions. Because you'll be



forced into an unfair game of software leapfrog. Words and pictures. All in good form.

With Legend, you can bring it all together. Write a paragraph, create a graphic to illustrate your point,

paragraph, create a graph

then make it look good on the page. It's the perfect combination of functions for people who function best with efficiency.

Yet as self sufficient as Legend is, it's not too proud to ask for help. Legend will graciously import practically anything you'll ever need. Like scanned images, files from Micrografx, paint packages, spreadsheets and many others. Even your current word processing files.

Make your documents legendary.

For the best way to make a lasting impression with your documents, don't ask for divine intervention. Call 1-800-922-8828 (in Canada 1-800-668-8640) ext. 500, for more information or a \$9.95 evaluation disk Leaend from NBI. Because the creation of an

important document shouldn't bring you to your knees.

EGEND

PC LAB NOTES

```
fincludecasiloc.h>
char **ptr;

.
    /* set pointer to allocated space for 188 chars */
if([ptr = (char **psalloc(188))]
    return EMRON;

.
    /* reallocate pointer space for 288 chars */
if([ptr = (char **)[realloc(ptr,788)])
```

Figure 9: Array pointers can be used to allocate space dynamically instead of statically declaring the array. Ptr points to space for an array of 100 characters. Later, the space can be reallocated to hold a larger number of characters.

```
struct _tree
    char *word:
    int
            count;
    struct _tree *left;
struct _tree *right;
};
void treeprint(struct tree *node)
    static int depth = 0;
    if (node)
         printf("\nLevel %d: %d occurrences of %s",
             depth, node->count, node->word);
    depth++:
    treeprint(node->left);
    treeprint(node->right);
    depth--:
}
```

Figure 10: Using static variables in recursive functions can reduce their stack overhead. In this example, members of a tree-structured list are printed, and the variable "depth" is used to track the depth in the tree at the time a node is printed.

functions like printf() (and its brethren) are designed to handle a whole assortment of formatting conditions and cases. Unfortunately, that level of generality requires IK to 3K of code in most implementations. Look for opportunities to eliminate these routines from your program.

Use a switch() in the place of multiple ifs. While some compilers are smart enough to optimize these, you'll find this alternative will also improve the readability of your source code, a virtue all of us could use more of.

A number of other useful techniques can be conveniently grouped together:

 If the source code for the runtime library is available, study it to see if a muchused or oversized routine can be optimized for your specific use. Both Borland and Microsoft provide the source to their runtime libraries for a reasonable nrice.

If the runtime library source is not available, study the assembler output of the compiler and see if you can write an assembler version optimized for your specific needs.

3. Consider writing your own routines in assembler if it can be done without too much hassle. The "hassle" factor is a key to your effectiveness—I'm not too fond of this solution, as the "hassle" factor with assembler is often not worth the price.

If you're going to use assembler, see whether your compiler supports in-line code, that is, assembler embedded in your C code. Turbo C, for example, does this.

 Better still, if you're leaning toward assembler, use register variables (not the register keyword) if they are supported by your compiler. For example, Turbo C will support the following statement:

_AL = 1;

Figure 11: Using in-line code and register variables can shrink yaur code. A call to the Videa Interrupt is shown using both in-line code and register variables, and the more traditional int86() approach.





APPLE MACINTOSH AND COMPAQ, TOO.

Short-term projects can be long on problems if you don't have the computer equipment you need. That's why renting PCs and peripherals from GE for presentations, trade shows, training sessions or seasonal expansion makes so much sense. Our vast inventory of IBM, Compag, Apple, quality compatibles and related equipment is ready for overnight shipment. So, anything you need can be there fast. From a sea of Blue to a bushel of Apples, one phone call is all it takes. Call 1-800-GE-RENTS.

ORDER NOW AND SAVE 15%! Rent a PC or peripheral from GE Rental/Lease rental order. So, renting from GE becomes more than

before October 31, 1988, and we'll take 15% off your first just a great decision, It's a great bargain, too. Call today-1-800-GE-RENTS. Dept. L.

Call 1-800-GE-RENTS, Dept. L. Or Mail This Coupon.

☐ Yes! I'm interested in learning more about your offer of 15% off my first PC or peripheral rental. I understand I am not obligated in any way. Please send your FREE catalog of GE Rental/Lease products and

Company

_Ext or Dept _ Send to GE Rental/Lease PO Box 103123. Atlanta GA 20348

CIRCLE 740 ON READER SERVICE CARD



"Secure"

si kūr,' a. [L. securus]: The ability to keep your confidential data and your whole personal computing environment away from prying eyes and meddling associates.

Securing your personal computer files has, until now, been a complicated and mostly unreliable matter. Not any more.

The Tandon Personal Data Pac is the world's first truly removable, self-contained Winchester hard disk drive that pops in and out of its receptacle with the stroke of a key. You just lock the Personal Data Pac with your entire computing environment in your desk or your safe.

And when your business keeps you on the move, the Tandon Personal Data Pac lets you take your office with you. It fits easily in your briefcase or your garment bag. If the airlines lose it, don't fret. Backing up a

full Personal Data Pac onto another takes only a few minutes. So you can take one and keep a copy secure in your safe.

The Personal Data Pac protects your data well. It's

a hearty little traveller that can take a lot of abuse. It can cope with the rough and tumble world of the postal system, as well as

take an occasional knock off your



desk. Your precious programs and data remain cradled inside. Safe, secure, and ready to use.

The Tandon Personal Data Pac shatters the storage limitations of your personal computer. When your first high-capacity Data Pac is full, pop in a fresh one and you're ready to go on. Infinitely.

If you need to share your PC, software and data, the Tandon Personal Data Pac offers the safeest, cheapest and most reliable "network"

"network" pos sible for transferring high-

capacity files quickly and easily. And, you can make any computer your personal dedicated workstation, simply inserting your own Data

by Pac. show

Let your Tandon Dealer show you how the Personal Data Pac can make living with your PC more economical and productive. See him today, or call us at 1-800-556-1234, Ext. 171 (in California 1-800-441-2345, Ext. 171).

Security for a small price.



We're redefining personal computing. CIRCLE 232 ON READER SERVICE CARD



INTRODUCING THE \$249 HAND SCANNER FROM THE COMPLETE PC. The top photo shows you how a whale appears in the wild.

Below it is how that same whale appears on your PC after being scanned by The Complete Hand Scanner. And then how it appears printed in your desktop-published newsletter.

With The Complete Hand Scanner, you can crop, scale, even rotate an image to fit your needs, then merge or insert it into virtually any graphics or personal publishing software program. An image that - at a resolution

of 200 dots per inchcomes remarkably close to images created by scanners costing thousands of dollars. Yet The Complete Hand Scanner costs only \$249. including its own Soft Stationery software. You just hold it in your

hand and scan anything up to 21/2" x 10". All you need is an MS-DOS

PC with a hard disk and graphics card. And a commitment to save the whales, logos, letterheads... Call (800) 634-5558 for more information and a dealer near you.

THECOMPLETER

Nete PC, Inc. The Complete Bland Scanner and Soft or Bushos of The Complete PC, Inc. MS-DOS is a regent

CIRCLE 144 ON READER SERVICE CARD

PC LAB NOTES

```
ret
VidGetCurFos
VidGetCurFos(int *row, int *col)
                                     /* Int#6() vermion
    union ands re
    r.h.eh = 3;
r.h.bh = 0;
    intes(exte, ar, ar);
    *row = r.h.dl
    *col = r.h.dl;
       wever, the assemblar produced from this function is much larger,
    end slover:
```

ap,16 ; ellocete the register atructure byte ptr [bp-15],3 - -

```
byte ptr [bp-13],#
ax,word ptr [bp-16]
                                       : r.b.bb = e
            ax, word ptr (bp-16)
            ax, 16
             mear ptr_int#6
                                         ; int#6() - additional overhead
            al, byte ptr |bp-f|
            40.0
            bx, word ptr [bp+4]
                                    : row = r.h.dh
            al, byta ptr |bp-18|
ah, 8
           bx, word ptr [bp+6]
word ptr [bx], ax
                                   + col = r.h.dl
VidSetCurFoa
                                                                   (Figure 11 ends)
```

which becomes

VidCatCurPos proc bp.ap ap,16

using intdos(), or a similar scheme, as you can see from Figure 11. These latter approaches use a structure to represent the

move values to and from the structures and mov al,1; registers-not to mention the overhead of in assembler. This is faster and more compact than

the function calls themselves

Writing optimal C is a matter of becoming a master of time and space-at least from your program's perspective. As in programming itself, your-most important

machine registers, and they require code to

resource is your imagination. There are more techniques for size optimization than I could cover here. In Part 2, however, 1'll take you through the much more intense world of speed optimization in C.

Richard Hale Shaw is a contributing editor of PC Magazine.

TuneUnYour



is an encyclopedic reference to the commands and functions in all versions of AutoCAD. including the newest. Release 9. This guide covers keystroke instructions, tips for practical applications, and potential pitfails. Our expert

magazine. Cohn thoroughly understands AutoCAD's flexible design capabilities, and has created a number of enhancement programs to make the most of them.

This is the guide you want at your side. Available wherever computer books are sold. Suggested retail price: \$26.95.

A ADDISON-WESLEY Reading, Massachusetts . Menlo Park, California . New York

Don Hills Outgrie . Widonshow Fantand . Anadonian . Bram . Sydne Singapore * Tokyo * Madrid * Bogotu * Santingo * San Juan

CIRCLE 538 ON READER SERVICE CARD



Finally! A Keyboard Protector That:

· PROTECTS CONTINUOUSLY - 24 HOURS A DAY -Against computer downtime due to liquid spills, dust, ashes staples, paper clips and other environmental hazards.

- · REMAINS IN PLACE during the operation of your keyb SafeSkin is precision molded to fit each key-like a "second skin · EXCELLENT FEEL - The unique design eliminates any interference between adjacent keys, allowing smooth natural operation of your keyboard.
- · SafeSkin IS VIRTUALLY TRANSPARENT Keytops and side markings are clearly visible. In fact, SafeSkin is so clear, times you may not know it's there!
- · DURABLE LONG LASTING SafeSkin is not a "throwaway" item. Many of our protectors have lasted over 3 years under continuous daily use, without failure.
- anous communities and use when the many services and portables including IBM, APPLE, AT&T, COMPAQ, DEC, EPSON, KEY, TRONICS, NEC, TANDY, TOSHIBA, WANG, WYSE, ZENITH, Specify computer make and model. Send \$39, 35, Check or M.O., 1938. & Mc Include esp, date. Dealer inquiries invited.

Merritt Computer Products, Inc. 4561 S. Westmoreland / Dallas, Texas 75237 / 214/339-0753

CIRCLE 347 ON READER SERVICE CARD



Put JT Fax In Your PC

Instead of walking back and forth to the fax machine, and waiting around, you can send and receive fax messages at your desk.

JT Fax[™] - \$395 With JT Fax in your PC, you can send and receive facsimile messages, including signature and letterhead



IT Fax Portable - \$495

JT Fax Portable slips into your pocket and plugs into any MS DOS machine's serial port to let you fax from wherever you are.

Call To Order

To find out why the award-winning JT Fax has been receiving such high praise, call us at (404) 564-5566.









RAM SNOOPING WITH RAMVIEW



RAMVIEW lets you sift through your PC's memory and search for strings in ASCII and hex without unloading your current application programs.

Ost programmers will admit that DEBUG is an indispensable tool for studying the internal operation of the IBM PC. Using DEBUG, you can look through memory, search for strings, and perform many other debugging activities. And even if it's not the best memory-snooping program available, DEBUG has the endearing quality of being supplied free with DOS.

DEBUG does have its limitations, however, noet of which is that you can't always invoke it when you want to. For example, it isn't possible to safely call it up from within a memory-esident program. Another limitation is that it won't advange let you examine the memory contents you're interested in. DEBUG itself modifies certain memory areas, including some of the interrupt vectors, and a few sophisticated programs contain anti-DEBUG code. including some

RAMVIEW solves these problems. Because RAMVIEW is a memory-resident memory viewer, you can call it up at almost any time simply by pressing this box key. You can then display any area of memory and search for a particular ASCII string or HEX sequence. In his the additional advantages of being very small (about 2.500 bytes) and presenting memory of the property of

Although programmers will probably find RAMVIEW valuable in situations where DEBUG won't work, it can prove just as useful to nonprogrammers who are interested in better understanding what goes on inside their computer. With RAM-VIEW, it's easy to say, "I'll look into it."

GETING RAMVIEW The easiest way to get your own copy of RAMVIEW . COM is to download it from PC MagNet, as explained in the accompanying sidebar, "RAMVIEW by Modem." The assembly language source code, RAMVIEW. ASM, is listed in this article, as is a BASIC program, RAMVIEW.BAS, that will create RAMVIEW. COM when you run it once. The . ASM and . BAS listings are also available through PC MaeNet.

You install RAMVIEW.COM simply by entering RAMVIEW at the DOS prompt, or by putting the command in your AUTOEKEC.BAT file. RAMVIEW will make itself memory resident, display its installation message, and return to the DOS prompt. RAMVIEW isn't particular about the order in which you install it rela-

RAMVIEW is valuable to programmers when DEBUG won't work, and it helps nonprogrammers understand what goes on inside their computer.

tive to other TSRs. But be careful of some other misbehaved TSRs, like SideKick, which insist on being loaded last.

When you are ready to pop up the program, simply press Alt-R and the RAM-VIEW screen will appear. To exit RAM-VIEW and return to the underlying program, press the Esc key.

As shown in Figure 1, RAMVIEW displays a row of titles at the top and a row of commands at the bottom of its screen. The remainder of the screen is filled with a hex and ASCII dump of a section of the PC's memory space. From left to right, the screen shows the absolute addresses (labeled SEG OFF), and the hexadesimal of the screen has a state of the screen has the memory dump area of the screen has with the beat digite of through F. This screen design lets RAMVIEW show 368 bytes of memory at at time.

The RAMVIEW commands are listed on the bottom line. To execute the commands Goto, Hex search, Ascii search, and Next, just type the first letter of each. To execute the remaining commands to which RAMVIEW responds, you simply press the indicated key.

RAMVIEW COMMANDS If you want to move to a particular area of memory, you can do so with the Goto command. Just press G (for Goto), and the prompt "Goto address 0000.0000" appears on the bottom line. The prompt works in typeover mode, so you enter the eight digits that correspond to the desired address.

ITHITIES

To check the ROM revision date of your PC, for example, use Goto POOPETE, The date will appear in the upper left comer of the ASCII window. Keep in mind that RAMVIEW's display is static and does not update itself automatically. Any changes to values stored in memory that occur while RAMVIEW is in control will not be apparent unless you reread the area by issuing a movement command.

To search for an ASCII string, simply press A. When the prompt "ASCII Search String" appears on the bottom line, type the string you want to find and press Enter. The string may be up to 20 characters long. All searches are case-sensitive, so the strings COPYRICHT, Copyright, and copyright are all distinct.

RAMVIEW begins the search for the string at the current memory location. If a match is found, RAMVIEW stops and displays the memory area containing the string. If the end of memory is reached without finding a match, RAMVIEW will PC's memory.

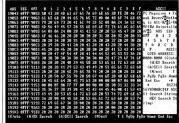
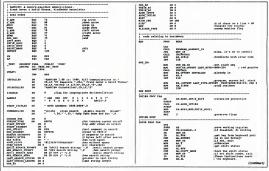


Figure 1: The main screen of the RAMVIEW program, showing the addresses and contents of the PC's memory.



RAMVIEW.ASM: The assembly language source code for RAMVIEW.COM.

PRODUCTIVITY

	CHI	AL, 60s 618, AL		SETFOR END?			
	129 100 100 100 100 100 100 100 100	61H,AX AL,AX EMONT \$+2		CETTOS PROC HE	AA.		
	2007	ENORT \$+2 610,85	:1/0 delay for feet AT's	1	200 200	AX, 3 AX, 80	:get curser position
	CLI		:Disable interrepts and :reset the int controller		117	100	jective page jest ourser position in da
	OUT	AL, 203 200, AL	Areas con the controller	CETTON END?	**7		
	ON CALL	CS:NOTT,S NE ARE SONY CS:SONT, ESTS NOSY ACCUST FOR VIONO MODE CANT FOR CD	precession protection	CURSON_OFF PRO	C HEAR		
	OM	CETERNT, DETT MARY	recereion protection ident ellew re-entrency seat fleg for protection		PURB BOV CALL	CI, 201CX	stern off cureer value
	CALL	ADJUST FOR VIORO MODE			CHL	SETCER	
FT_909_UP+	Se	NEM	cell our progress	CURSON OFF THE	POP		
17 909 UF	CLI		(diesble ktd momentarily				
ARE SUSTI	AND	CB:808T,80T(18T9_80FT)	reset pretection	CERSOR_ON PROC	PERM		
	POP	AX.	prestore working register		NOV CALL	CE, CURSON TYPE	plake me curser velos
200		AX	rectors to threatment		POP	CI STATE OF THE ST	
	CLI			CURROR ON ENDP	NAT.		
75. 1900	JHP	C8+A000_E8196	;let BOM code do Ite work	SETCUR PROC HE			
						AE .	
beck for tes	t modes	and mot offeet Aaxecters is bength			137		function to set cursor shap
is lived > c		CATACORES ES SANDEN	***************************************		POP		pthet's sll
FUST_FOR_VII				SETCUR ENG?			
	POSS	84 45, 15 175	jest present mode	person roytle			
	IXT	116	view breasur wood	SAVE_SCREEN PO	OC HEAR		
	CHEP 208	AR, 60 BAD MODE			ACRE LOSS CATT	ALBN OAL CRE	peers data segment
					200	AX, AX	
	3600	STTE PTS CS-DIFF, AX CS-DITE PTR DIFF, 00 AL, 7	reale the f of chors > 88 ren the lime & move in diff ;7 is mone		HOV CALL	AN, AN CALC SCEN ADDR ST, OFFERT LANT STEE	; hiffer to peet end of prop
	SAIR CHP 2018	ML, 7 TRY COLOR	17 is moso				;hiller to peet end of proj ;eachenge ;de and ee
GE G#1		TRY_COLOR			POP	24	rde and ee
-	POP				POP ECBG	AR	cambanna ancero destination
T COLOR:				SAVE, FEET LIST		01,81 16,25	,
-cooks	00 208	AL., 3 NOOS_CH	;3 is notor ##m25	ENVE PEXT LIFE		C1,60	serve 2008 section section sertical services
1 BOOM 0		NODE_ON			MEP AND AND ORC JHE FOR CALL	BL-CS:DIFF	recede
_	STC.	ANT	sect good mode		200	SI, CSIDIFF	;line ;25 lines
	POP				2918	SAVE MEST LIVE	
PURT FOR VIO	es_woos	Estr		1	CALL	TABLE ON CRI.	restors date organit
			***************************************	PANK PUREER EN			
	celled h	y preceding but key		CLEAR SCHESS P			
S PROC BEAR	CALL			COMPANIE A			
	HOY	BRAPES AX, CS	zeev eteck		HOY	AX, AX	
	CALL CALL CALL CALL CALL	AX.CS DG.AX PLICKES	rdetermine presence of eno-		CALL HOV	NOW OFF CHT AX, AX BX, AX CALC SCAX ARON AK, 87284	;eddress of (F,F);;spece with normal ettribute
	CALL	PLICEES SAVE CURSON CURSON OFF SAVE SCHEES CLEAN SCHEES		CLEAR SERT ALS	MON	80,24	, space with meanir sections
	CALL	BAVE SCREEN	jeave elfeen	CURN BRIT THE		C8,88	
	CALL	PROGRĀS	ido our program		THE CALL	DI.CO.SIPP	ywords yes to next
	CALL	PROCESS SCREEN PROTORS SCREEN CUASON ON PROTORS COPROR	sput ecreen back		ADD	DI, CHIDIPP	:line :24 lines
					JHE	CLEAR REST LINE TORN ON CHE	,
	CALL	PESTORE COPSOR					
	CALL	MENTONE COPROR	spet etask back				
	RET	RESTORE CORSON BRANCOT	ithet's all	CLEAN_SCREEN IS	NEP.		
IX END? 1008AN PROC Y	RET TAR	BALLOUT			780C W		
	RET TAR	AX, AX		SESTONS SCARES	780C W	TUBE OFF CRE ME, AR	
OSBAN PROC N	RET EAR	BALLOUT			PROC WI	MAY, AND THE STREET	;eddress of (F,F)
OSBAN PROC N	EAR EOR HOV CALL	AK,AX AX,AX ST,OFFSET LAMILS STSPIANI,STSPISS		ARSTON SCARES	PROC MI CALL NOR NOV CALL HOV	THE OFF CHE ME, AS ME ME, AS ME ME, AS ME ME, AS ME	:eddrese of (\$,\$) ;beffer past end of program
OSBAN PROC N	EAR EOR HOV CALL	AK,AX AX,AX ST,OFFSET LAMILS STSPIANI,STSPISS	;row 8 real # photten line pahnw header line rpun hee display up ;lest row		PROC WI CALL NOW CALL NOW CALL NOW CALL NOW	ME, AND , SM, AND , CALC SCHE ANDS ST, OFFSET LAST_SYTE AND, 25	
OSBAN PROC N	EAR SOR HOV CALL HOV SOR	AX,AX AX,AX ST,OFFSET LABELS STSPAX, STRIPS BOOT AU, 24 85 AM	;row 8 real # photten line pahnw header line rpun hee display up ;lest row	ARSTON SCARES	PROC WI CALL, NOR MOV CALL, NOV HOV	AN, AN . SE, AN . CALC SCHE ADOR SI, OFFERT LAST_STYR NE, 25 CS, 68	
OSBAN PROC N	EAR EOR HOV CALL HOV SOR HOV CALL	AX, AX BX	;row 8 real # photten line pahnw header line rpun hee display up ;lest row	ARSTON SCARES	PROC WI CALL, NOR MOV CALL, NOV HOV	AE, AE SE, AE CALC SCHE ADDR SI, OFFRET LAST, STTE AE, 25 CE, 60 SOUTH SOUTH SI, OS-SUFF SI, OS-SUFF SI, OS-SUFF SI, OS-SUFF	perce 2000 perce po to mest
OCHAN PROC N	EET	AX,AX AX,AX ST,OFFSET LABELS STSPAX, STRIPS BOOT AU, 24 85 AM		ARSTON SCARES	PROC WI CALL, NOR MOV CALL, NOV HOV	AF, AF , BF, AF , BF, AF , CALC BCHS ANDR CALC BCHS ANDR BI, OFFSET LAST_SYTE AR, 25 CS, AS BOTHS BI, CS DIFF BOTHS	perce 2000 perce po to mest
0000A PROC N	EAR EOR HOV CALL HOV SOR HOV CALL	AX, AX BX	;row 8 real # photten line pahnw header line rpun hee display up ;lest row	RESTORE SCARES	PROC WITCH STORY SALES S	AK, AR , BY, AR , BY, AR , CALC BORN ADDR 11, OFFRET LAST_SITE AR, 25	
DOBBA PROC Y	EET	AX, AX BX	;row 8 real # photten line pahnw header line rpun hee display up ;lest row	RESTORE SCARES	PROC WITCH STORY SALES S	AF, AF , BF, AF , BF, AF , CALC BCHS ANDR CALC BCHS ANDR BI, OFFSET LAST_SYTE AR, 25 CS, AS BOTHS BI, CS DIFF BOTHS	perce 2000 perce po to mest
27 SCHEEN: 27 SCHEEN: 27: 27: 28:	EDA EOR HOV CALL HOV FOR HOV CALL JPC BET	AX, AX BX	;row 8 real # photten line pahnw header line rpun hee display up ;lest row	RESTORE SCARES	PROC WI CALL SOR SCO CALL SOR SCO SEC HOV HOV HOV HOV HOV HOV HOV HOV ADD CALL ADD CALL HOV HOV HOV HOV HOV HOV HOV HOV HOV HOV	AK, AR , BY, AR , BY, AR , CALC BORN ADDR 11, OFFRET LAST_SITE AR, 25	perce 2000 perce po to mest
DOBAM PROC S 27 SCHEEN: 27: 27: 27: 27: 28: 28: 28: 28: 28: 28: 28: 28: 28: 28	BET	AL AN ALLAN ALLAN CONTROL LABELS OF COMPANY PROPER OF COMPANY PROPER OF COMPANY CARREST CARRES	;row 8 real # photten line pahnw header line rpun hee display up ;lest row	RESTORE SCARES	HET HERE SELL STATE SELL SEAR SELL SEAR SELL SEAR SELL SEAR SELL SEAR SELL SELL SELL SELL SELL SELL SELL SEL	AL, AZ BL, AZ BL, AZ BL, AZ COLOR ADOR CL. OFFERT LAST, SYTE AZ CL. 68 EXTEN CC. 61 CETT CC. 61 CETT EXTEN EX	pase 2888 porte porte porte porte porte porte porte porte porte
OSBAN PROC S	BET	AL AN ALL AND	grow g real g re	RESTORE SCARES	PROC WEAR PROC WATER SON SON CALL SON SON CALL SON SON CALL SON	AL, AZ BL, AZ BL, AZ BL, AZ COLOR ADOR CL. OFFERT LAST, SYTE AZ CL. 68 EXTEN CC. 61 CETT CC. 61 CETT EXTEN EX	perce 2000 perce po to mest
C SCHEEN	BET	AL AN ALL AND	root # root # root # root # root m root her dise root up root her display up riest roo	RESTORE SCARES	PROC WEAR PROC WATER SON SON CALL SON SON CALL SON SON CALL SON	M. AN DELAY COME STATE AND	pase 2888 porte porte porte porte porte porte porte porte porte
C SCHEEN	PART POR HOY CALL HOY FOR HOY CALL JPC BET	AL AM AT OFFER LABELS 6190AL PRISE BOOT AL AM AT ANY BOOT BOOT BOOT BOOT BOOT BOOT BOOT BOO	grow g real g re	RESTORE SCARES	PROC WEAR PROC WATER SON SON CALL SON SON CALL SON SON CALL SON	M. AN DELAY COME STATE AND	pase 2888 porte porte porte porte porte porte porte porte porte
T SCREEN	EAT BOX BOY CALL CALL BOY BOY BOY BET	AL AN ALL AND	grow g real g re	RESTORE SCARES	PROC WILL SOR SOY CALL SOR SOR CALL SOR CALL SOR CALL	M. AN DELAY COME STATE AND	pase 2888 porte porte porte porte porte porte porte porte porte
COMMAN PROC S LT SCREEN: LT: COMMAN PROF ACTUAL OR THE COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROC S COMM	PARTY PA	AL. AN ALL OF THE PROPERTY AND	grow g real g re	RESTORE SCARES	PROC WILL SOR SOY CALL SOR SOR CALL SOR CALL SOR CALL	M. AN DELAY COME STATE AND	pawe 2000 powed power part of the part of
COMMAN PROC S LT SCREEN: LT: COMMAN PROF ACTUAL OR THE COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROF COMMAN PROC S COMM	EXT EXX EXX EXX EXX EXX EXX EXX	MALOUT ALL MA ALL MA	grow g real g re	RESTORE SCARES	PROC WILL SOR SOY CALL SOR SOR CALL SOR CALL SOR CALL	ALLANDA CALL CONTROL AND	pawe 2000 powide powide 1015e0 120 115e0 120 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 130 115e0 130 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 1
CENTRAL PROCES CENTRAL PROCES CENTRAL PROPERTY CONTRAL PROPERTY CONTRAL PROPERTY CONTRAL PROPERTY CONTRAL CO	EAST EOST	AL. AN ALL OF THE PROPERTY AND	grow g real g re	RESTORE SCARES	PROC WILL SOR SOY CALL SOR SOR CALL SOR CALL SOR CALL	ALLANDA CALL CONTROL AND	pawe 2000 powide powide 1015e0 120 115e0 120 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 130 115e0 130 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 1
ET SCHEES: ET SCH	PART NOR HOW	MALOUT ALL MA ALL MA	grow g real g re	RESTORE SCARES	PROC WE CALL MAN THE PROPERTY OF PEAR CALL MAN THE PEAR CALL MAN T	ALANA CALL STATE AND	pawe 2000 powide powide 1015e0 120 115e0 120 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 11 115e0 130 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 130 115e0 130 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 115e0 130 1
ET SCHEES: ET SCH	EAT BOX	ALL AND ALL AN	rine ()	MASTONS_SCATES MASTONS_MEXT_L ARTHUR COMESS PARTONS_COMESS TYPES_COM_COME PA	PROC WILL STORM ST	ALLANDA CALL CONTROL AND	pawe 2000 powed power part of the part of
ET SCHEES: ET SCH	EXT ZOR ZOR ZOR ZOR ZOR ZOR ZOR ZO	ALL AND ALL AN	rine ()	MARTON ECANON MARTON ECHECATO MARTON ECHECATO TYPE OR CRY PR	HET HERE HE CALL HOW	M. A. M OLIVE TORS ASSESSED AND ASSESSED ASS	part of book antique
	EAT BOX	MALOUT ALL MA ALL MA	grow g real g re	BESTONE_TAXES BESTONE_ECALES BESTONE_ECALES BESTONE_ECALES BORBON	PROC MI CALL PROC MI CALL MAN	ALLANDA CALL CONTROL AND	pase 2888 porte porte porte porte porte porte porte porte porte



With IRMA remote, you can talk to your mainfran Whether you're on the road in Why Arizona or you are That means downloading files electronic

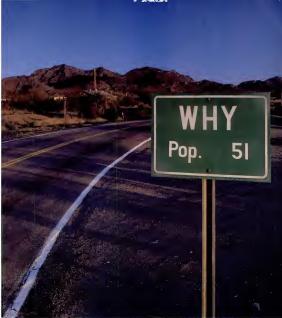
opening a remote branch office in Chicago Illinois, you and your personal computer can be as close to mainframe information as the nearest telephone. Introducing IRMA remote* from DCA*

IRMAremote offers reliable, inexpensive and accurate access to your mainframe no matter where

mail, data extraction and data entry—everything, in fact, that IRMA"offers. And that includes supporting all of the mainframe file transfer software from DCA and IBM" your company has invested so much in.

What's more, it doesn't matter what kind of protocol your network runs on. Right now, there are

DCA is a revisioned trademark and IEMA and IEMA are trademarks of Floridal Communications Associates for IEMA is a revisional trademark of Internal



from places once considered out of the question.

IRMAremote products for both SNA and BSC. Soon, there'll be a third for X.25. And if you use moderns with the Hayes*AutoSync feature, all you have to buy is our IRMAremote software.

Perhaps most importantly, IRMA remote is made by DCA, the company that has set the standard in reliable micro-to-mainframe communications. A fact that your Data Communications Manager will really appreciate when you request an IRMAremote for yourself or your office.

Not only will a phone access your mainframe, it will also access all the information you need on our IRMAremote products Dial toll-free, 1-800-24-IRMA extension 518.

CIRCLE 531 ON READER SERVICE CARD



Introducing the database designed to please a bunch of perfectionists.

We're not easily satisfied at WordPerfect, a fact that's worked to our advantage. After all, it was our high standards that helped us to produce the world's leading word processor.

But those same high standards made it difficult to find an acceptable database for use at our headquarters. So we built our own.

Introducing DataPerfect' 2.0, the WordPerfect' compatible database that's now available for perfectionists everywhere.

Our people wanted power, speed and easeof-use. DataPerfect is powerful enough to create accounting and payroll applications, allowing simultaneous network access to all records and files. It offers rapid look-up capabilities, even when thousands records are involved. Providing the speed to manage our luge databases efficiently. And, with DataPerfect's ment-driven system, we can now define a database in a matter of hours.

Itter of hours.

We think DataPerfect is the database for the most hard-nosed perfectionists. So if your standards are as high as ours, it's made to order for you.

For more information, call or write WordPerfect Corp., 1555 North Technology Way, Orem. Utah 84057. (801) 225-5000.

DataPerfect from WordPerfect

■ UTILITIES

	Ext	AT, IMPE		1 200 00001			
	Ixt	AF, TAPPE 163 AL, 188	:Cae PC Regestre's method		CHP	ML,"A" NOT ARCTI STANCE ARCTI STANCE MESO EXIT	physcil search
	JX.		ref determining		CHIL	ANCTI SEARCE	ifind early string
	CMP JX HOW HOW 197	Ad. 129 ML, 189		BUT MICH FRAM	307		
	197			AND ARCIT SEASO		AL, "9"	; Syea mearth
	2007 2005	PLICEPREE	gif hi changed, its equ		CALL	NET SERVICE NET SERVICE NET SERVICE	: find bes string
	MOV MOV TENT	AN, 46H ED, AN ED SETTE PER(636), 46H		POT_REX_SEARCH	260	ME-SU MEXTY	
	TEST	58:8772 PCR(636),468	scheck for min (* om flacker)	~~_AES_SEASES		ML, "9"	(Fjext search
PLICKPREE:					CHILL	NOT SERT GEARCH NEXT GEARCH NEXT EXIT	ified nest string
TH COA:	MOV	PLICKE PRINTS				MENU EXIT	
FLICKER EMP	RET			NOT SELT STANCE		AT, U. ARR	rep acres
					290E 8000 2900	act Or	
TURR_OFF_CRT P		CS-PERCORN PARE,-1	rie it flicher free?		2107	SHORT MOVELT	
	PIEE	BO SHOW		900 UP:	œ	AX, 90MZ	:go to beginning of memory
	POSS				29% 807 807 307	BOT SOME START OFFERT, S START STUMBET, S SOME MENU EXTY	
	CALL	MAIT VERT	mank to torn aff cet		MOV	START SECREPT, S	
	MOV MOV	AX MALT VERT AL, 25s cs, 10ss os, AL	rturn it off	NOT NORTH			
	POP POP	AK AK	lents to sea	1	ce	AX,880 EXT	;go to end of memory
DO SHOW:	POP	94			201 201 201	START OFFEST, SPINSS	step of last page
	RET				MOV	NOT SEED THE NOT SEED START OFFICET, SPINSON START SECONDAY, SPINSON SHORT MENN XXXX	
TURN OFF CRT S	no#			NOT_ERD:	CHP	AZ-D AMR	down arrow
MAIT WEST PROC	HEAR		is it flicker front			AX,D ARR BOT BONS AX,TEN	loom stron
	CHO JX	CS:FLICKER_FREE,-I FORALT AX	ing at flicker free?		MOV JMP	AX, TEN	
		AX DE		wat poets			
	PUGG MOV	0K 0K, 20A#	;color status port	1	CHP	AX, POUP	Ibnås ab
MATTO:	111				352 80V 392	AX, -170s	
		AL, DX AL, 0		MENT CHECKS		SHORT MOVEST	
MAITI:	J901	WALTE	weit for wertical off	And the same of	CHP	AX, PC08 AX, 1786	spage down
	19	AL,OK			200 21 200		
	TEST	AL. S WAITI	resit for veryes; on	anortin.		MEST_MENU_FET	
	POP	OE AZ			CHEL	MOVE	
BOMBIT!		-		MENU MEST	es.c		colear carry for east
MALT_VEST ENDS	PET			9017 83171			rshet's all
2000				MENU ERCO	100		
retect routies	•						
				reste etertion	amazes?	and offert for displey	
RETADOR ON S	28			NOTE PROC SEAS			
	P02	CS-RETADOR	reare callers address reare their stack	AND PROC READ	OR	AX, AX	is the movement signed pro-edd to segroff potherwise make positive pathract from offset pit so carry, done noise wrap segment
	M24	CS:THEER SE, SS CS:THEER SP, SP			JAKE MEG	AZOIT AZ	pro-end to exproff
	MOV MOV	ES, CS-OLD 50	president to our stack	10	903		rashtract from offset
	PURE		pages all registers	T.		HOVE EXIT START SEGMENT, LESSE EMOST MOVE EXIT	pairs wrap segment
						SMORT MOVE XXIT	
	7000	12					
	POSS	63 64		ADDIT:	A00		
	PUSH	CK OM SI OI					
	PUSS PUSS PUSS PUSS	ex ex ex		MOVE_EXIT:	ADD	START OFFIST, AX HOVE BATY START SECRENT, 1869H	;add movement to offert pif no carry, done pelme wrap ampered
	PUSH PUSH PUSH PUSH PUSH PUSH PUSH	CX ON ST OI EM DS					
sarra mor	PUSS PUSS PUSS PUSS	ex ex ex	return to caller	NOT EXIT:	AND AND NET		
	POSS POSS POSS POSS POSS POSS POSS JMP	CX ON ST OI EM DS	return to caller	NOTE_EXT	AND AND NET		
SWAPES ENGY SWAPOUT PROC N	POSS POSS POSS POSS POSS POSS POSS JMP	CX ON SI SI SI SI DE EF CS:RETADON		NOT EXIT:	ADD RET FOULTRE	START OFFEST, AX MOVE TRITY START SCOREST, 18479	padd movement to affect pif me carry, done palse wrap amposit
	PUES PUES PUES PUES PUES PUES JUES JUES JUES PUES JUES PUES JUES PUES PUES PUES PUES PUES PUES PUES P	CK OM SI OI ER DG FF CS:METADON	return to caller save callefs address practice all registers	NOT EXIT:	AND NET FOULTH	START OFFEST, AX MOVE TRITY START SCOREST, 18479	padd movement to offert pid as carry, done pelse wrap asympto
	PUES PUES PUES PUES PUES PUES JUES JUES JUES PUES JUES PUES JUES PUES PUES PUES PUES PUES PUES PUES P	CX ON SI OI ES DO SF CS::RETANDOS CS::RETANDOS ES DO DO DO DO DO DO DO DO DO DO DO DO DO		NOT EXIT:	AND ANT POULTING	START OFFSET, AC SOME ST. LEVEN START, SECRET, LEVEN START, SECRET, LEVEN START, LEVEN ALL 24	padd personent to affort pif to carry, doe- relne wrap segment.
	PUES PUES PUES PUES PUES PUES JUES JUES JUES PUES JUES PUES JUES PUES PUES PUES PUES PUES PUES PUES P	CG ON SET		NOT EXIT:	AND NATT FOULTING TEAM CALL NOV 108 NOV	START COPEST, AX MOSE TRIP START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 1999 AL-24 SL-24	padd movement to affort plif no carry, does relee wisp objects rejear line for input plast rew plare see
	PUES PUES PUES PUES PUES PUES JUES JUES JUES PUES JUES PUES JUES PUES PUES PUES PUES PUES PUES PUES P	CG ON SET		NOT EXIT:	ADD NET FOULTH NO. SEAL NO. SE	START COPEST, AX MOSE TRIP START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 1999 AL-24 SL-24	padd movement to affort plif no carry, does relee wisp objects rejear line for input plast rew plare see
	PUES PUES PUES PUES PUES PUES JUES JUES JUES PUES JUES PUES JUES PUES PUES PUES PUES PUES PUES PUES P	CG ON STEADON CO -		NOT EXIT:	POUT THE POUT THE POU	START COPEST, AX MOSE TRIP START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 1999 AL-24 SL-24	padd movement to affort plif no carry, does relee wisp objects rejear line for input plast rew plare see
	POSS PURE PURE PURE PURE PURE PURE PURE PURE	CA ON	;eere callers address restore all registers	NOT EXIT:	POUT THE POUT THE POU	START COPEST, AX MOSE TRIP START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 19499 START, SCOREST, 1999 AL-24 SL-24	padd movement to affort plif no carry, does relee wisp objects rejear line for input plast rew plare see
	POSS PURE PURE PURE PURE PURE PURE PURE PURE	CX OR OR OF	:sere callete address ;restore all registers ;restore callers stack	NOT EXIT:	AND NATT FOUTING HOT SEAL CALL HOT GALL HOT	STATE OFFSET_AND SHORT EAST STATE SEGMENT, 18479 CLEAR LAST_LIPE AL_2C SLEAR SL_OFFSET_ANCEL SEARCE STREEN SL_CC STREEN SL_CC STREEN SL_CC SL	inde moments to affect and management and management and management are reported as a second as a seco
SERFORT PROC S	POSS PURS PURS PURS PURS PURS PURS PURS PU	CA ON	;eere callers address restore all registers	NOT EXIT:	AND NATT FOUTING HOT SEAL CALL HOT GALL HOT	START OFFSET, AN MOST EAST START SEGMENT, 1979 CLEAN LAST LEFE CLEAN LAST LEFE CLEAN LAST LEFE CLEAN STEELS CLEAN STEELS C	padd morement to affort its and the weap ampoint release the for import inter prompt recent inter prompt recent inter prompt red = cel after prompt red = rev col rel = cel after prompt reside = rev col reliase the action
SHAPOOT EMDS	POSS PURS PURS PURS PURS PURS PURS PURS PU	CA OF STREAMON CO-RETAINON C	:sere callete address ;restore all registers ;restore callers stack	NOT EXIT:	POUT NET FOUT NEW FOC SEAL FROM FOR	STAND OFFERT, MAY SHOW EAT, 1979 CHAM LAST LUFE M. 157 M.	and memorate to offered all memory, does not palse weep perpent release the for import class res class re
SHAPOUT ENDS	POSS PURS PURS PURS PURS PURS PURS PURS POP POP POP POP POP POP POP POP POP PO	CX OR OR OF	:sere callete address ;restore all registers ;restore callers stack	NOT EXIT:	POLITICAL PROPERTY OF THE PROP	STAND OFFERT, MAY SHOW EAT, 1979 CHAM LAST LUFE M. 157 M.	and assessed to offere place warp perpent place warp perpent place warp perpent perpentage of the perpent perpentage of the perpent perpentage of the perpentage of the perpentage of the perpentage of the perpen
SWAPOUT PROC S	PODE PUBE PUBE PUBE PUBE PUBE PUBE PUBE PUB	CC. OI . O	:sere callete address ;restore all registers ;restore callers stack	NOT EXIT:	POLITICAL PROPERTY OF THE PROP	START OFFERT, AND START	and assessed to offere place warp perpent place warp perpent place warp perpent perpentage of the perpent perpentage of the perpent perpentage of the perpentage of the perpentage of the perpentage of the perpen
SWAPOUT PROC S	POUR POUR POUR POUR POUR POUR POUR POUR	CC. CT. CT. CT. CT. CT. CT. CT.	iere collete address practice all registers practice collete atomit pretare to collet	NOT EXIT:	POUT NEW YORK NEW YOR	START OFFERT, AND START	and assessed to offere place warp perpent place warp perpent place warp perpent perpentage of the perpent perpentage of the perpent perpentage of the perpentage of the perpentage of the perpentage of the perpen
SWAPOUT PROC S	POUR POUR POUR POUR POUR POUR POUR POUR	CA MAT MERT	iere collete address practice all registers practice collete atomit pretare to collet	NOT EXIT:	POLICE HOUSE BOY	START OFFERT, AND START	and assessed to offere place warp perpent place warp perpent place warp perpent perpentage of the perpent perpentage of the perpent perpentage of the perpentage of the perpentage of the perpentage of the perpen
SWAPOUT PROC S	POUR POUR POUR POUR POUR POUR POUR POUR	CA MAT MERT	iere collete address practice all registers practice collete atomit pretare to collet	NOT SELT: NOT SELT: PROTE SELT: ACCT, SEASON P	POUT NEW YORK NEW YOR	STAND OFFERT, MAY SHOW EAT, 1979 CHAM LAST LUFE M. 157 M.	and aromans to offere a plan warp property of the marry, and the first lipes to be a property of the marry and the marry of the marry o
SWAPOUT PROC S	POOR POOR POOR POOR POOR POOR POOR POOR	CA MAT MERT	presence callers address presence all registers presence all registers stank presence caller stank presence and presence a	NOTE ESP	Sec and sec an	START OFFERT, AND START	and assessed to offere place warp perpent place warp perpent place warp perpent perpentage of the perpent perpentage of the perpent perpentage of the perpentage of the perpentage of the perpentage of the perpen
SWAPOUT PROC S	POOR PLOSE P	CC. CT. CT. CT. CT. CT. CT. CT.	present all registers present all registers present caller	NOT SELT: NOT SELT: PROTE SELT: ACCT, SEASON P	Sec and sec an	START OFFERT, AND START	and aromans to offere a plan warp property of the marry, and the first lipes to be a property of the marry and the marry of the marry o
SWAPOUT ENGS SWAPOUT ENGS STREET LAST LOS	POOR POOR POOR POOR POOR POOR POOR POOR	CO STATEMENT OF CONTROL OF CONTRO	prove college address present college address all registers allows are address and a second	NOTE EDS	Jack ADD NATT POINT IN THE PROPERTY ADD NATE ADD	START OFFERT, AND START	and aromans to offere a plan warp property of the marry, and the first lipes to be a property of the marry and the marry of the marry o
SWAPOUT ENGS SWAPOUT ENGS STREET LAST LOS	POOR POOR POOR POOR POOR POOR POOR POOR	CO STATEMENT OF CONTROL OF CONTRO	present all registers present all registers present caller	MOTE EEP :	SHC ADD NATT POOL 1 No.	PRINT DEPTHY, AN PRINT, SECURITY, 1889 CRAST, LANT, LANT CRAST, LANT, LANT CRAST, LANT, LANT CRAST, LANT, LANT CRAST, LANT, LANT CRAST, LANT, LANT CRAST, LANT, LANT, CRAST, LANT, LANT, CRAST, LANT, LANT, CRAST, LANT, LANT, CRAST, LANT, LANT, CRAST, LANT, LANT, CRAST, LANT, LA	and aromans to offere a plan warp property of the marry, and the first lipes to be a property of the marry and the marry of the marry o
SHAPOUT PROC S SHAPOUT EMOP	PODE PUBE PUBE PUBE PUBE PUBE PUBE PUBE PUB	CONTROL OF	ison called addess praises all rejaines praises all rejaines praises to called provide a called the called provide a called the called and called praise and called the called and called and called and called and called a	NOTE EDS	SHC AND NATT POINT IN THE PROPERTY OF THE PROP	COMPANY AND SERVICE AND SERVIC	and montant to affine a size of the court of
SHAPOT PROC S SHAPOT ENDP CLEAR LAST LIS CLEAR LAST LIS IMAGE SCOOL S	POUR PURP PURP PURP PURP PURP PURP PURP	CONTROL OF	present all registers present all registers present caller	MOTE EEP :	Jack ADD RET POUTTINE FOR TELL ROW BOY BOY ROW	PERSON CONTROL AND	and around to office a class of the many deposits o
SHAPOT PROC S SHAPOT ENDP CLEAR LAST LIS CLEAR LAST LIS IMAGE SCOOL S	POORS POUR POUR POUR POUR POUR POUR POUR POUR	CONTROL OF THE PROPERTY OF THE	passes calles addess practer all registra practer calles cant practe calles ca calles ca calles calles calles ca ca calles ca ca calles ca ca ca ca ca ca ca ca ca ca ca c	MOTE EEP :	Jec And Mart Tourist Mart Tourist Mart Tourist Mart Tourist Mart Mart Mart Mart Mart Mart Mart Mar	PERSON CONTROL AND	and around to differ a control of the control of th
SHAPOT PROC S SHAPOT ENDP CLEAR LAST LIS CLEAR LAST LIS IMAGE SCOOL S	POUR PURP PURP PURP PURP PURP PURP PURP	COLUMN CO	passes calles addess practer all registra practer calles cant practe calles ca calles ca calles calles calles ca ca calles ca ca calles ca ca ca ca ca ca ca ca ca ca ca c	MOTE EEP :	Jee And Mart Fourtise For Hall State of Call	PERSON CONTROL AND	and around to affice a side of water, and a side of si
SHAPOUT DROP : SHAPOU	POORS POUR POUR POUR POUR POUR POUR POUR POUR	CONTROL OF THE PROPERTY OF THE	ison called addess praises all rejaines praises all rejaines praises to called provide a called the called provide a called the called and called praise and called the called and called and called and called and called a	MOTE EEP :	Jee And Service Servic	THE COMPT. AND THE COMPT. COMP	and arrange and a state of the
CLEAN_LAST_LIS CLEAN_LAST_LIS	POUR PURP PURP PURP PURP PURP PURP PURP	CONTROL OF	permetalization address president all registers all registers all registers all registers at an address and addres	MONT_EXET. MONT_EXET. MONT_EXET. MONT_EXECUTE MONT_EXE	Jee And Mart Fourtise For Hall State of Call	PERSON CONTROL AND	and around to affice a side of water, and a side of si
SHAPOOT PROC S SHAPOOT EMPS PELSHER LAST LIFE CLEAN_LAST LIFE CLEAN_LAST LIFE SCHOOL PROC STAN SCHOOL PROCESS	POSTS	COLUMN TO THE PARTY OF THE PART	passes calles addess practer all registra practer calles cant practe calles ca calles ca calles calles calles ca ca calles ca ca calles ca ca ca ca ca ca ca ca ca ca ca c	MONT_SERVE_ MONT_S	Jec Add Mary Fourtile Add Mary	THE COMPT. AND THE COMPT. COMP	and arrange and a state of the
SWAPOUT PROC S SWAPOUT ENDP release last 1 class_last_lis class_last_lis class_last_lis	POUR PLUS POUR POUR POUR POUR POUR POUR POUR POUR	CONTROL OF	passes calles addess passes alles addess passes alles addes passes to calles passes to call	MONT_EXET. MONT_EXET. MONT_EXET. MONT_EXECUTE MONT_EXE	Jec Add Mary Fourtile Add Mary	THE COMPT. AND THE COMPT. COMP	and measure to address and to enter a second

UTILITIES

thes search rout	tiee			CONVENT_ABOR PO		96	
NEK SEARCK PROC	FEAR				20P	B16 D2	; set so for stee
		CLEAR LAST LINE SI,OFFRET WEE SEARCH PO AS, 24	primer line for ampet		CALL	CONVERT SITE CONVERT_SITE	sequest
	HOV	AB , 24	lies ton				jonles.
	SOR CALL	GIRPLAY STRING	rfirst col jabow the prompt ified out how long pringt is pdl = col after prompt idx = row col		CALL	CONVERT STTE CONVERT STTE	jeffeet
			ified out how long pringt as				pthet's ell
	MOV	0L, CL 09, 24	rdi = coi after prompt rdz = row coi	CONVENT_ADER EX			
	BOY CALL	SI, OFFSET SHE SEASON AND CE, 25 CLEAR SUF	isise of the stging	CONVERT SITE PR	OC HEAR		reet two chars
	CALL	CLEAR SUP	large or can actual		CALL	ASCII SEE TO BEE	reaks her
	NOV NOV	OF OFFIRE HEE STEVE	:pointer to mieve :replacement ther replace, mi-prompt, di-sueve		MOV	1011, AL 10 HI	posts has put in destination past up for seet character pthat's all
	CALL	ids-row sol, cs-siss, bu-	replace, si-prompt, di-suevo				that's all
			th spointer to search strong	CONVERT_STTE BE	OP.		
	CALL	879129		display sain s			
	CRP 288 907	NO REASON	otherwise search fails		CE002		
	WOR	LAST SEARCE STRING, SI	inest be at least two diguts jetherwise search fails jears it jears length jeliminate blacks in Leget	BOOT PROC PEAR		TUNK_OFF_CET	stars off monitor if recess
	CALL	ELISTRATE STANKS	reliminate blacks in repot		PUBL	SP COP CAN	inee the
	CALL HOY	CONVERT ANCID HER TO HE	Taxes length		MOV.	87, 67 87, 67	juse the juse the process variables of temporary variables of just start pointer
	HOV	SEARCE NES	ified it				passe de for mein roitise
POSEARCE:	SET		reports to least two digits jetheruse search fails jetheruse search fails jears it jears it jears indianate his in impet jears langth fails langth jetherus langth jetherus all		LEE MOV	SE, DWOED PTE START OFFE	ry jet start pointer
NEX SEASON THOP						SP-4),ES MONALISE	for later use
					CALL	BODALISE	rehards sorbx at 18h cm ha
clear despail w	ith ces) spaces			MOV	(8P-4),EX (6P-9),ES	Ifor later use
TARA SUF PROC S	TAR			1		86, [8P-4] 81, [8P-2]	iget pointer
	PURE	cx			MON	CE INON, B	jer later use jetning serbu se 18h co he jetning serbu serbu jistinije jetning jistinije jetning
	PUBIE	at		san rise.	INC		reest display row
	909 200	STTE PTR [SI]," "			80Y 205	AR, CB/BOW	ITOW
	LOOP FOR	CLEASIT		1		CALC SCHE ADDS	jest seed; for that addrses
	POP	81			MOV CALL	CK, [\$0-0]	thi part of nore 20 hit dee
	POP BAT	**			TRE	MOND PERSON-ST	radd 1 to see a 16 bytes
TOWN THE BARLES					TRC WOW	MER TO ASCIT HER	:get le part
					ECRG.	NET TO PRESE BEE	plowest eignificant spible
		ring to hirary string, re	florm size ik CK		CALL	CHAR OUT SPACE DUT CX, [SF-4]	iprust to part of 'Ass' val
SULTING THEY	9 70 68	K STRING PROC NEAS				Cx. [87-4]	jeel pert of more 20 hit dem prist in one 20 hit dem prist in one - 16 bytes tent in pert connect to assis lowers in lowest to assis lowers to prist 10 pert of 'ABS' vai sput appart of 'ABS' vai s
	POSIS"	Er or,er	pages at for use to main		CALL	MOND OUT AL. TO CRAA OUT	
	HOV HOV		deplicate of			CHAN DET	iby a coine
100000	LODGIV		cent two seril dissis		CALL		its coins jeffest this line jeffest this line jeffest this line jeffest the print je characters to print jears ptr to prisent line
		AL, AL	rest two secil digits race we at the end rif so, string is converted rin case wrong # digits		MOV	MORD SPACE CX, 12	16 characters to print
	22	C ERTT All, As	in case wrong & dugite	AND PARTY		68,62	
		AUCTI MEX TO SHE	istring is converted itransists serii to binery /pet beck in string /pet mest two characters		LODES		igst character
	CALL STOES		/pet back in string		CALL	EFFE OUT EFFC OUT HEX FERT ET, DK	igut charactur sprint two hem mybbles sprint epace sail 28 hem digite spet par to person line rail 18 hem digite spet par to person line rail 18 hem digite sprentree the accil part
	1907	MEXAC		1	LOOP	HEE PERT	rall 18 hea digite
	NOR.	AL, AL	pticar al		MOV	58,16	rell 18 hee digite
	STORE SUB LEA	01.88	policer al jput turnizator after this jet dout how many bytes jeedors important requeta- jthet's all	MICIT PARTY	MOV	CE,16 AL,78E	preverse the secil part
	LEA	CE, [SZ-1]	lee yess constract	WELL PARTY	MOVES STORE		prist the ascii port
	POP	81	restors important requeter			A4001 BA48	ings + 10 land the macif chard liminates attribute on it
COMPRET_ASCII_SS	E to H	01_9792MG 280P			ADC ADC	WORD PTR(BP-8),189	1.990, + 10
		-				MCCII PANT WORD PTR(BP-8),188 WORD PTR(BP-3),8 WORD PTR(BP-2),188	
relose up blanks		string					jif it wraps
ELISIMATE SCANES	PROC 6	HAR			A20 M07	MORD PTROSP-43, 1988X	jif it wraps jump the sequent jest the deta sequent
		št.	past desti and meds to nore	10,19921			
	7000 707	DO AS	, to 486 \$5145 to 5577		CHP .	CE:ROW, 23 BEXT LERE	; if not completely does
	MON	61,61			29 PGP ADD		prestore de for main routie primes off temporary variet
MES, 05:	Looss		:get character		A00	8.1	relean off temporary variab
	CHP JS	MENT DO	if space		POP	TURN OR CRT	restore bp that's all
				9007 ESSP	NET		that's all
	COR.	ML, ML SERT DQ	ill seco	HIRO STREET LANS			
				SPACE OUT LANS.	CALL	W080 007	reetput two symbles from ca
	POP 287	91	restore important register that's all	SPACE OUT LANEL	MEAN		ithan
SLINDSATE SCARRE	NET DESP		imper.e ell		2007	SSORT CHAR COT	restpot a space
				WORD OUT LABEL			
ige to command					CALL	AL, CS SYTE OUT	yes high mysels sprint it
						SYTE OUT AL, CL	
	CALL	CLEAR LAST, LIST	relear lies for imput	SPTE_OUT LABEL		MEX_TO_ANCIZ_MEX	int hee to two char and in-
	HOV EOR HOV	CLEAR LAST LINE AS, AS SI, OFFSET START CONFLAT DISTANT STRING TY 1985	100	1	ETOES INC		jrvt hee to two char mythle iprist highest order mythle image iow order mythle
	NOV	SI, OFFERT STAFT DESPLAT	18compt	1		AL M	seet low order sabble
	CMA	CINPLAT STRING	igne of	CHAR OUT LANEL			
	HOV HOV	AT OFFICE ATAME OF BE AN	15 efections inn		57068 180	90	spriet it sekip attribute sthet's all
	HOV HOV		:eise ;sirre		107		thet's all
	BOY	DE, OFFSET AGOS STEVE	restace char	END_ROUSE START	790C H	DA .	
	CALL	rds-yew cel, cx-sise, he-			LES .	BE,DWORD PTR START OFFS	IT
	MON	SILDFFRET START DISPLAN	15 :eerii eddress		MOV.	EX,DWORD PTR START_OFFS SCHOOLISS AE,AS	or jget and segment johange seits so life or be jeare monumilised result ifor leter use igst sed address johange seits so life or he
	MOV MOV CALL	DI, OFFORT START SDUMENT	15 parti address identication 132 hit secil address to pur		MOV MOV		ifer leter pes
	CIC	CONVEST, ADDR	132 But secil address to pur	1	CALL	BE, DWORD PTR END OFFSET	iget and address
oro pape	RET			1		SOUNTERS EXTERN	iget and segment Calculate segments to sear
				1	NOV.	SEARCE SECRETES, OX SEARCE STITES, SE	(Calculate segments to sear
							of bytes in final convert
	e bines	y segment and offset to destination			MOV	SEARCS_SETTES, SE	(RAMVIEW ASM con

THE CORPORATE SOURCE

COMPUTERS

HARDWARE

SOFTWARE

PRINTERS

- 1 TF

2500 WEST COUNTY ROAD 42 . #5 . BURNSVILLE, MN 55337 . (612) 894-0595

A Small Case For BIG Performance!!! ZENITH



CALL T1000 T1200F T1200H T3100 T3200 T5100

SUPERSPORT Dual Floppy CALL 20 MB HD CALL

SUPERSPORT 286/20 CALL

NEC Multispeed

\$1495

EL-2 HD

\$2295

Accessories

TOSHIBA Carry Case/5100 em T1000/1200/3100/5100 dem T1000 1200BPS dem T1200 Sner Ac Adapter Automobile Pwr. Adpt. for

T1000 & T1100 59 99 859 195 399 299 599 1399 599 75 17 Key Keypad T1000/1200 15 Key Keypad T3100 Exp. Chasis xp. Chasis IF 1100/1200/3100 rt 5.25 FDO 768 KB EMS Mem/T1000 2MB Mem Ext/T3100/20 3MB Mem Ext/T3200 1MB Men Ext/T11/12/31/2 Ext But T1200 2MB Mom Ext/T5100 **ZENITH**

Carry Case 59 329 399 19 Int Modern 1200 BPS Ext 5.25 FDD Cig Light Adapter 79 299 399 79

Int Modern 1200 BPS Int Modern 2400 BPS lattery Pac (Nicad) Automobile Adapte

Welcome Holmes . . . External 5.25" FDD \$299

Specify TOSHIBA or ZENITH

INTERNAL MODEMS

TOSHIBA T1100+/1200/3100 1200 BAUD \$199 2400 BAUD \$269

1200 BAUD \$199 2400 BAUD \$269

WonUnder

\$299 Single card expansion slot for the T1100+, T1200, T3100/20 & T5100

\$319 Diconix 150P Portable Printer Laplink Plus When Purchased with any Lapton

Let Our DAILY ROUTINE organize yours! her you are involved in selling a prod or time and resources By completing se simple input screens, DAILY ROU

DALLY ROUTINE is menu-di use that you can put the man

DAILY ROUTINE © Copyright 1947 First Pr (1) TODAYS SALES CALLS (2) TODAYS AGENCE (3) EXPENSE & MILEAGE REPORTS (4) NAME & ACCRESS FILE

Special \$149

 Competitive Price Corporate Volume Discounts Net Terms to Qualified Corporate Accounts

Prices Subject to Change Without Notice

To Order Call:

FAX Number: 612/894-6175

IN MN: (612) 894-0595

■ UTILITIES

	NOV NOV	20.AX	jest seibs t		1	90V X0R	(8P-6),0X	colear count of chera entered
US START	MOV ANT ANDP	**,**	ithet's ell	-	WEST_DESPLAY		es,cs	here telpes open
						POSS HOV CBIS HOV SOR HOV CALL	61 AL.(67-5)	prow
it poi	eter is	early from seg	ment-offest in ea-be			CBIE	N., (47-6)	jisto au
PROC P	EAR THE	**				208		peol pinto bu
	P288 P288	CX	for male re	egime mediacasa		CALL	SI, [SP-4] DISPLAY STRING	;abow string at si
	708# 1977	AX, XX	iget the off	eet.		POP POP PORA	AK	prestore replace cher
	907 907 5185	CL. 4 AK. CL	iget the eff	eregraphs		POP	84	last th attied surressied
	M01/	DX, SS DX, AX	jet segment		MERT_FRY	CNP	STEE PERIOD, "C"	ratio colon is destination
	MOV EAL EOE		iback Loto a	egment into megment se mod 19 quaters otime		JNE	807_COLOR	seest creen
	EUE	AX,CL AX,AX	iberse - ber	se nod 19		200	DL	mast col point to mast char
	POP POP	CX AX	ifor male re	quatera etime	907_CELCR1		627706	
	909 PET	AX	ithet's ell			CALL CHE 21 CHP 21 CHP 21 CHP 21 CHP 21 CHP		:set cursor position :get mant key :if eran = 1
ER BELF						21	END OF IMPUTITION It's	
*********						CKP	END OF IMPUT; then it's END OF IMPUT AN. L ADM SACT SPACE EN, STE	ilf econ - Ich ithen it's carriage retarn if it's left arrow
for mate	a of st	ring beginning	at start_engees			211	AN, L AND	pif it's left arrew
HER PROC	HEAR					CHP	NY, SES NOT BACK SPACE	iff it's beckspace key other back up
-	CALL	DI, CE ENG_MINUS_STAR	reave string realculate s	erse length	BACK_SPACE:		MOY_BACK_EPACE	
AGAZIFI	Care.	-	s tours than o	r sens) 4427		2688	HERT_PET	jlf count # man't hack up
	JAE HOV HOV	HOME THAN ENCO	08	ch P4k get what's left		DRC DRC DRC DRC	06.	identered column
	907 683	Cb., 4				CHP	SYTE PER(SI),";"	if pointer is to colon,
	A00	AX, SEARCS SYTE	s redd to the	pten to search lest fow byten			EYE PIN(SI),";" BACS SPACE SYNC PIS(SI),BL HEXT DISPLAY	jif count 8 man't beck op idecrement column jdecrement column jdecrement peleter to check jif pointer is to colon, ithem back up again jput replace cheracter in jebow lima again
-	JHP.				HOT BACK SPACE	300		leuon trav edera
-	607	AK,-1	184k mearch		1	CH2*	CK,[BF-2] FEXT_FET	; is count - mas count ; if so, cos't put in buffer
	808 20	BEARCH HOT POU	pashtract in	stial offeet such size? f string size sarch size? to servh sarch size? rch size?	MEST_IMPUTS	race.	ATTACKED .	int a char di a siese
		MEASON NOT POU	subtract of	etring size		JACS.	MERT SET	jum w char di w miove jif illegel char get new kmy jethereise pot in buffer jest comot jpsieter to memt char
	JEX CNP	SEASCH NOT POUR SEASCH NOT POUR	no riess than a	to search		INC INC	CX CX	locat const
	75 MOV		ids cole and	earch alse?		INC INC	60 61	ipaleter to west cher inart column jebow line squin
	CNP JS MOV MOV STA		innaher -1 -	ements to serve	END_OF_DIFFET:		MENT_DISPLAY	
	924	SEARCS_SEGMENT	F.DK :decrases th	egments to search s amount to search ds = strang also s-bytes to search g, strang as found ter after feal		CHP	SC. "0" SD XENO SYTE PTR(SI),0	if replace ther is "6" ident put terminator in iterminate string
	CALL	STARCS	jei - string	di = string sise		31	STE PERCETAGE	iterminate string
	38 A00	SEARCS FOURD	rif sage fla	e, string is found	NO_XXXIO:	CALL	CURBON OFF	
	ADD MOV JMC	AX.I SX.BX	ilsto so hu	-11		POP RET	69,1	sclean off stack
	JIBC 1407 ADS 1607	BN,ES	integration	ofte over	1997 2997	RET		ithet's all
	A59 W77	AX, 11666	to the		SETEET PROC 450			
	CALL	EGRALIES	PRE	t at the top of	ORDER PROC 163	X08	AX,AX 288	igothey function number igo get a key restare it
	JHP	SOOK_MGAIN	is cen selve	et.		THE	198	restace it
	100 E	AX,AX ES,AX AL,1	parant over		CETRET ENDP			
n round:	OF	AL,1	pelser sero	fleg	148 - FOU 3K -	col	displays string at	da sal
	1924	START SECRET,	IS 1005 page .		CISPLAY_STRING			
	MON MET	START_DFFEET,4	ES set page seddress of that's all	found atring	DISPLAT_STRING			peave at for male routines
CH_HEN ENGP						POER CALL	CALC SCRIF ADDR	pot soudi for row col
atriae di		o sies serby s	molecur to buffer to a	narch		HOV	SALT VENT	rest normal stiribute
- ounder of	hytes	o buffer to see	pointer to buffer to a rob. Sero fleg est if	found	SXXT_CHAR	Longs		
OF PROC FEAT			;el pelets s	1 etring		08 2X	ML, ML LAST CEAR 11 se	jest char from string test for mare ro, string has been printed her and ettribute on ocrmin string has been printed
	POSS POSS	AX DI					MATT_CEAR 11f as	ro, string has been printed ber and sttribute on ocrmen
		61 61 63		data area	LAST_CEAR!	2907		string has been printed
W001	HOY	CX, ex	istring size, ptr to is chere in segment	to search		P09	91	contact at the sale
	Looss		other for first part	of mastch			**	prestore at far majo routines
(BCI)	exper Jul	BCAEB	jie firet cher le et	ring in buffer	FOSPLAY_STRING	E+1+		
	POSS	BOT_FOUND	pis first cher lo at pif not, no match peers spainst copeb		IAX - FOW her o	el. re	ures said pointing to t	be estate address
	POSS	51 CS	re represent copes		CALC SCRE ADDR			
	DEA JORK	CK, [SE-1]	of chara in string -	1	CALC SCHE ADDR	PORE PORE	M CI	
	SCEX AXP	CK, [SE-1] ONCE CHAR CMPSS	of chara in string -	we have found at			AX.	rmal destroys dx jeave ax for later jette es jetteen mag - hessh jif 48.45 7
	202	CH	prestore for nest or			HOV	SS,CO.STOR ENG	linte ee
			,	-			EN STIE PER[456],7	11 40745 2- 7
	POP JNE	DEST_RECK	jif ar - 0 theo atri	og met feund		2918 2017	BY, BEFX	reten seg - been
OUND+	S.E.A. POP	an,[02-1]	opts to lest first o	hererter found	CCC-08+	H07	AX,AX	;ieto se
	POP					P09	CX	jest rom If the steel to a row of test If the sectors > 40 If of attribute bytes > 40
	POP POP	**	pates o all			320	AN, COIDIPP	: cherecters > 83
M MADE	ART		reserve all			MUL		prom * 160 * diff*2
						HOV FOR HOV AZO AZO HUL AZO AZO	AZ,AZ AZ,AZ	
cowscol,ex-	ex lee,	bxwreplace ober	ector, si-prompt, di-sis	Ye.		MOV POP		presidi pointe to right addres
PROC MEAR	PT 1610		create stac			P09	es es	
	PUBLIF	12,12	CEMATO STAC	x Exame	CALC_POSS ADDS	ENCP		;thet's all
	HOV HOV	[69-2] CX	peave slas o	f destination				(RAMVIEW ASM contin
	MOV SUB CALL MOV	12,12		f destination	CALC_POSS_AS	nik.	na ente	OR ENTER

COMPLETE 12 MHz **ZERO-WAIT 286 SYSTEM** WITH 32MB HARD DRIVE!

Can you believe it? Yes you can!

32 MB hard drive, 12 MHz ZERO Wait State, Fully AT compatible. Our complete '286 system ready to plug in and fly right out of the box! At the amazing price of only \$1,295!

How is it possible? By buying direct from the manufacturer that's how. ZEOS International offers you the finest, best-backed fully AT compatible systems available . . . at factory direct prices.

We think you'll agree, this is the very best value you'll find anywhere.

And every ZEOS® system is fully assembled, burned-in and tested in our own laboratories. We would like to build one for you. Give us a call today!

OTHER ZEOS OPTIONS:

■ Basic System Only: Everything except HDD/HDC.

■ Complete 64 MB hard drive system! Only \$1,595 ■ EGA Upgrade. 14" EGA color monitor with ZEOS EGA

card. Fully tested. Add \$495 ■ Many other drives and options available. Call Toll Free for details, 800-423-5891.



the ZEOS⁶ Customer Assurance Program as well: 1. Full refund within 30 days of shipment if you are not absolutely satisfied. 2. One full year limited warranty on parts and la bor. 3. Federal Express replacement of any failed parts for your first year of ownership.

NEW! ZEOS® '386 Tower System Available now! Zeos® 386 Tower Sys-

tem! Complete with 64 MB HDD; Adaptec 2372 HDC, 1:1 interleave, 800 KB/sec transfer rate: 1 MB RAM, Zero-Wait, cache memory, 1.2 FDD. High Resolution tilt swivel monitor, 101 key keyboard, and more. Complete 20 MHz System

STANDARD FEATURES INCLUDE:

12" High Resolution Amber
Screen TTL Monitor with Tilt
& Swivel base, Easy on the eyes! 80286 CPU Zero-Wait State Motherboard with 8 I/O slots and socket for 80287 Math Co-processor.

/12 MHz Dual Speed, eyboard Selectable, ero Wait-State. hoenix BIOS!

Deluxe AT-style

\$3.495! 16 MHz \$2.995! Heavy Duty 200W Power

Real Time Clock/Calendar with Battery Backup.

512K, 80ns Memory expandable to 1MB on the Motherboard.

Hard and Floppy Drive Controller; 1:1, 800 KB/sec!

Serial and Parallel/ Printer Ports.

1.2 MB High Capacity Flo

■ 32MB hard

High Resolu hrome Gra

AT is a registered trademark of IBM Corporation.

Due to currency fluctual tions and other factors are subject to chang without notice Call for complete warranty details

In Minnesota Call: 612-633-4591 FAX Orders Dial: 612-633-2310

ORDER NOW TOLL FREE

CIRCLE 723 ON READER SERVICE CARD

530 5th Avenue NW Suite 1000 St. Paul. MN 55112

UTILITIES

0000:0000.

To try the search, first use Goto to set the current location to 0000:0000. Then select the A command and enter the string PC Magazine. You will get at least two

take you back to memory location | right notice inside the memory-resident | portion of the RAMVIEW program.

To find more matches, press N (Next). The next match should be the input buffer of the RAMVIEW program. This represents the string that RAMVIEW is using to matches. The first match will be the copy-

things you may want to search for are copyright notices. Use the strings (C), (c), IBM, COMPAO, Microsoft, and so on.

SEARCHING FOR HEX CODES Occasionally, you'll need to find a sequence of hex bytes. The RAMVIEW command

MRIFT PROC MEAS							
				PROGRAM ALBEAD		OC MEAN	
		CE (SEP	registers for main footines	1			inaly such for active copy
	PURK	01		1	1977	START SPORTET, 600	jetart efter dos
	POSS	61		1	1907	START OTFEST, S SNO_SEGNENT, CS	francisco presentation and
	POP	045 P.0			1927		tared receive perces, Ann
	200	61,01	jei - sieve eddress	1	1977	el GPPERT NTART	rates looking before you r get to this program retart at modified byte remough of a match rase our search rases or flag
	CALL		the many chars in slave (FE)		1000	CW. 23	reseast of a match
		ANY MAY	reet her if to there in street	1	CALL	CK, 25 SEARCE HISH	rese our search
		ARY BEY	ill lower case	1			reave or flee
		MOT SHALL				AR, START SEGMENT	
	ARD	AL, FORM	image abbet case	1	MOVE	AR, STRAT SPEET	reave in installed address
OT_SHALL:				1	160%	AR, START OFFEET	
	REPUE	BCARR	jessrch for char in the slove	1			
RT_KEY!		61	rest sero flag to indicate at		248	AR,CL	
	POP				029	AR, 100	padjest for pap
	POP	01			A00	INSTALLED SECREST, AN	
					MOV	START SEGREST, S	preset starting eddress
	RET		jihat's all		MOV.		
WRIFT ENDY					MOV	END OFFENT, FFE END SECNET, STFFFE	reset ending address
THERE PROC SEAS					807		prestore flor fgma concub
	****	41	reave at for main routines		POPF		
	P1788	81 88		PROGRAM ALREAD	. TA		
	MAN.	€K, -1	senset for struck laceth				
EXT:		401-4	Account for nearly resided				
	1300	CX	reext count	runingtal) res	1000		
	LODGE				CTA++		
	GA	M. M.	is it a seco	UNINETALL PROC	MEAR		
	200	MEXTS	alf not get meet ober	OWNERS DET PROC	CALL	NOOMED VECTORS SAME?	; if all vectors still books
	POF			1	31	UNINETRAL OR	pge sheed and dis lastalled
	POP	27	treators at for sale routions	1			And were and see tracelled
	207		(thete all		-	MORO PTE STATE	
TRACES ESSER			,	1			reles, chance the dischie f
							jelse, change the disable f
				1	war		jet the massage correspond
(rest a) wast	eil leb	sh - secii meb			CAP		rin the action that cares
ecomplet of	bee 11	"39", ah = "3" el = "1	recult: al - 3Ph	1		DE OPPRET DISABLED	I
notest: al + be	es byte				BOY	DE . SPPERT DIRABLED	i
				TTU OTHABLED:			ì
MCII NES TO SEX	X PROC B	EAR			1907	AH.9 210	reed display that message
			115 TAT - TET	1	INT	210	
			i		2007	TIRE SAKTHER OF THOMS	(all done here.
	8790	ANT AT-18	smake 18-15	UNINSTALL OF I			
AR BELLE					1907	ES, INSTALLED SECREST	iget resident prog's pap
	Test	AL., 480	1f "A" - "P"		1907	DE . SE WOAD PTR ADDR IN	the put back int 9 week
	28	AL EXIT	1	1	1907	DS. SS. WORD PTR ADDO 18"	118+2
	808	AL., "A"+16	reaks 18-25		MOV	AN, 250 AL, 9	
4,4171					MOV	AC. 2	
	AMD	AR, GPOPS	11f "9" - "9" make f-9		INT	218	
	50G	AL,1	1		1004	DE . SE . WORD PTH ADDR 18: DE . SE . WORD PTH ADDR 18:	108 praetore int 18h wer
	ENG.		1		200	DO . DO . WORD PTH AREK IN	1100+1
	180.		,	I.		AR, 250	
	11%	AL. 1	,		MOV	AG.,188	
	CR.	AL, AR	scoobine man and len		197		
	PET		pthet's ell		2026	**	
SCII SER TO REE	R REST				MOV	## ,##+[2CH]	jest segment of environment
				E.	MOV MOV	A8,470	rheineging to resident prop
					LWT	218	rfras it
imput: sl - cks	ar to be	reservated:			POP	**	
manaple: if	E DOS 14	'3F', si - '3' sh - '	E		1977	AH,498	ofree memory block at progr
motpers el - ma	ab of tr	seelstine, ah = lab of	AMAZAMBATZ		197 P317	21x	
					POER	CB CB	rest back our date seement
ER TO MICTI, SER	E PROC N	934H, 18H	: day AL/II-genaander an el		POP HOW	DE OFFERT UNINSTALLED	than come and gags sodown;
	98	45-45, 18H AR, 1818H	rdiv AL/II-genainder in el		1927	PROPERT OFFICE ALLES	
	CHE	AL. 15"	,		167	AR. 7 218	ofer whom it may economy
	CRF	ALCOT		OWERSTALL XXIT		***	ters seem to mak atmosts
	398	ALCEST AL. 7	sif a - f make "A" - "P"	ORGANIFALL XIII	BET		
	-		A	SHITTER PARK THEFT	~-1		
	cen	AR *5-		ANTWOOD SACA			
unit.		ARTEIT		SENTAL PROC B	ran		
MHIT:			rif a - f make "a" - "p"	THE PERSON NAME OF TAXABLE PARTY.	1927	CL.?	chiefs wanter 6
MEST:	JY8	AR. 1					
LEGIT:	ADD	AH,7				AT OFFERT AREA THESE	
LEKIT:	ADD BOND	AH,7			1907	61,0FFEET ADDR 18790	
LEGIT:	A20 3090	AL, AN	(that's all)		MOV CALL	01,0FFEET ADDR 18790 01,0FFEET 18790 18878ALL VECTOR	
LEGIT:	A20 3090	AH,7	(that's al)		MOV CALL MOV	01,0FFEET LETTE 01,0FFEET LETTE INVEST. SECTOR	:link weetne 18k
LEGIT: MEXIT: MEXIT:	BCHIL BET X END?	AL,AN	,,,,,,,		HOV CALL HOV HOV	61,0FFRET ADDR 18790 DI,OFFRET 18790 INSTALL_VECTOR CL,100	;lisk weetne 18k
.00.171 000.171 01.770_85011_000	BCHIL BET X END?	AE,AS	and of resident cuts and		907 687 687 907 907	81, OPPRET ADDR 18798 D1, OPPRET 18798 IBSTALL VECTOR CL, 188 81, OPPRET ADDR 187168	;link weetnr 10k
.00.171 000.171 01.770_85011_000	BCHIL BET X END?	AE,AS	,,,,,,,		HOV CALL HOV HOV	81, OPPRET ADDR 18798 D1, OPPRET 18798 IBSTALL VECTOR CL, 188 81, OPPRET ADDR 187168	plink weetne 16k
MENTY MENTY MENTY MENTY MENTY METY METER LANGE.	ADD SCHIL SET X END?	AE,AS	and of resident cuts and		907 687 687 907 907	61,0FFRET ADDR 18790 DI,OFFRET 18790 INSTALL_VECTOR CL,100	plink weetne 10k
MEXIT: HI_TO_ASCII_HEX AIT_SITS LASSI	ADD SCHO SET X ENDO STTE	AN,) AL,AN ;par) ;par)	s and of resident code and t of mamory used to save screen	INSTALL ERDS	HOW CALL HOW HOW HOW CALL RET	SI, OFFERT ACCS INTRO DI, OFFERT LET'S INTELL_VECTOR CL, ISW SI, OFFERT INTIFE SI, OFFERT INTIFE SI, OFFERT INTIFE	
MEXITO EX.TO_ASCII_MEX ATT_SITS LASS: COTALLED SSCORIA	ADD BEST X ENGO #TTE	AN,) AL,AN ;par) ;par)	s and of resident code and t of mamory used to save screen		HOV CALL HOV HOV HOV CALL HIT	el, ovyact acce inthe co, ovyact latte install_vector cl_10s sl_ovyact acce intles sl_ovyact intles sl_ovyact intles sl_ovyact intles	
MEXITO EX.TO_ASCII_MEX ATT_SITS LASS: COTALLED SSCORIA	ADD SCHO SET X ENDO STTE	AE,AS	s and of resident code and t of mamory used to save screen		HOV CALL HOV HOV HOV CALL HIT	el, ovyact acce inthe co, ovyact latte install_vector cl_10s sl_ovyact acce intles sl_ovyact intles sl_ovyact intles sl_ovyact intles	
MEXITO EX.TO_ASCII_MEX ATT_SITS LASS: COTALLED SSCORIA	ADD BEST X ENGO #TTE	AN,) AL,AN ;par) ;par)	s and of resident code and t of mamory used to save screen	INSTALL END?	HOV HOV CALL HOV HOV CALL BET	SI, OFFSET ACCS. INTOS COLOFFSET INTÉS INVESTAL VECTOR CL. 168 : SI, OFFSET INTÍS INCOMET INTÍS INSTALL_VECTOR	and mater analysis
MERITO BE_TO_ASCII MER BE_TO_ASCII MER BETTO LAGGI MOTALLED_SECOLIM IDANIZO SANLED	ADD SCHIL SET X ENDO #TTE OFF DW # D# D#	AB, 1 AL, AB ; MAT ; MAT ; ELSI CE, LF, *RAPVIEW 10 DIS CE, LF, *RAPVIEW 10 RE-	to end of resident code and t of memory week to serve serven common", co., ir, "5" common", co., ir, "5"		HOY HOY CALL HOY HOY CALL HET PROC ME.	ed; orract acon intro co; orract acts Install vector CL,16s el; orract acce int; ss el; orract int; ss el; orract int; ss AL, CL AR-15s	and mater analysis
MEXIT: BE_TO_ASCII_NEX ANT_SITS LASS. NOTALLSD_SSCRIM INANCED NOSELED	ADD SCHIL SET X ENDO #TTE OFF DW # D# D#	AN,) AL,AN ;par) ;par)	to end of resident code and t of memory week to serve serven common", co., ir, "5" common", co., ir, "5"		HOW GALL HOW GALL HOW CALL BET PROC HE.	SI, OFFSET ADDS 18798 DO, OFFSET LETTS INSTALL VECTOR SI, OFFSET LETTS INSTALL VECTOR SI, OFFSET LETTS INSTALL, VECTOR AL.CL. AA., 258	igst interrupt wanter
MERIT: SE TO ANCII HER ANT STEE LAGGI MOTALIAS SECRET TRANCO SPECIMINE IS WE	ADD SCHIL RET RETOR STITE OFF DW 0 DW DW DW	am, 7 Aliam ;mar/ jmin cm, ir, *mar/rev 10 bis cm, ir, *mar/rev 10 bis cm, ir, *mar/rev 10 bis ove charged slove pro-	to end of resident code and t of memory weed to serve serven content contents.		HOY HOY CALL HOY HOY HOY CALL BET PROC HE HOW HOW HOW	#2, OFFERT ACCE INTO DO, OFFERT ACCE INTO	igst vector number
MERIT: BE TO ASCII NER ALT SITS LASSI NOTALISD SEGMEN RAMATO GETCHIRDS I W.	ADD BCHE BET K ENDO #TTE #T DW # DH DH DAME? FE	AB_,1 AL_AB ;RAFT 16141 CG_LF_*RAFFIEW 10 D2 CG_LF_*RAFFIEW 10 RE- WARREST STAFF	is and if resident code and t of memory used to eare forces NATION', CO, LF, "5" COARDAD", CO, LF, "5" THE WAS INSTALLED.		HOY HOY CALL HOY HOY HOY CALL BET PROC HE HOW HOW HOW	#2, OFFERT ACCE INTO DO, OFFERT ACCE INTO	rost vector number
MERIT: SE_TO_ASCII NEE ANT_STE LAGGL NOTALLED_SEGGLM INANCO SPLOUDING IF WITHOUT SEGGLM SPLOUDING IN SEGGLM SPLOUDING IF WITHOUT SEGGLM SPLOUDING IF WITHOUT SEGGLM SPLOUDING IF WITHOUT SEGGLM SPLOUDING IF WITHOUT SEGGLM	SCHIL SCHIL SET A ESSO STTE ON DS DS CAME? FE	AN, AND PARTY OF THE PARTY OF T	es and if resident code and t of memory used to save serves NALES*, CO.LS*, "5" COLNERS*, CO.LS*, "5"		HOY HOY CALL HOY HOY OLLL HET PROC HE HOY	#1, OFFSET ACCE, INTO D1, OFFSET, INTO D2 A3, CC A4, CC A	igst interrupt sector
MERIT: 88,70 ASCII NER ATT STTS LASSI NOTALISD SEGMIN STANDED SECTION LE SECTION LE	ADD BENE BET E END? # END? # TOW # DOS DOS CAME? PE	AS, AS [BAST] [CI,IF, TANYLEY ID DI CI,IF, TANYLEY ID RE- ON CHIEF ID RE- CI,IFTALEO, EDIRETT AS A	ne and of resident code and it of memory weed to mere across NATION-CHILE-FS TOWNSHAME. On Liny-S- Tree was installed page executing segment		PROFESSOR BOY BOY BOY CALL BET PROC ME. BOY BOY BOY BOY BOY BOY BOY	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number jet interupt wactor jet replacement address
MERIT: SI_TO_ASCII (SER AIT_SITS LAGSI NOTALLED_SSCIENT NOTALLED_SSCIENT SPLOYING LETTONS	ATO SCHI SET A ENDO STTE OT DW 0 DS OCCUPANT ON DO STORE OT DW 0 ON DS OCCUPANT ON DS OCCUPANT ON DS	AS,) AL,AE PART PART	ne and of resident code and it of memory weed to mere across NATION-CHILE-FS TOWNSHAME. On Liny-S- Tree was installed page executing segment		PROVE ME. PROVE ME.	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	igst interrupt sector
MESTY: HI, TO ASCII HER HI, TO ASCII HER HOTALIED SEGMIN HALTO DECEMBED LT W.	ATO SCHI SET E ENDO STTE OF DW 0 DS DS DS DS DS DS DS DS DS D	AB, 1 AL,AE PART	es and if resident code and t of memory used to save serves NALES*, CO.LS*, "5" COLNERS*, CO.LS*, "5"		MOV	#1, OFFSET ACCE, INTO D1, OFFSET, INTO D2 A3, CC A4, CC A	iget rector number iget interrupt wanter iget caplacement sidroms
MEETT: HE TO ASCII WEE HE TO ASCII WEE HIT SITS LASSI HIT SITS LASSI HALLO SHALLO SHALL	ATO ECHT SET A EMBO STTE OF DW 0 DW CHTCLE DW CHTC	As, 1 Al, As [PAZZ] [STAT	is and if resident code and I of memory used to eare serven NAMES*, vol. 17** 5* THE WEST STATES OF THE STATES OF		PROFESSOR BOY BOY BOY CALL BET PROC ME. BOY BOY BOY BOY BOY BOY BOY	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number jet interupt wactor jet replacement address
MEETT: HI TO ASCII MEE ANT SITE LABBL WOTALLS SEGMENT HEALTS SPECIMENS IF WO	ATO SCHI SET E ENDO STTE OF DW 0 DS DS DS DS DS DS DS DS DS D	AB, 1 AL,AE PART	ne and of resident code and it of memory weed to mere across NATION-CHILE-FS TOWNSHAME. On Liny-S- Tree was installed page executing segment		MOV	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number jet interupt wactor jet replacement address
METT: MI TO ASCII HER MI TO ASCII HER MITTELLARI MARALED MARALED MITTELLARI MITTELL	ATO BENT SET R END STTE OT DW 0 DS CHOCKET PR NOV COP COP COP	As, 1 Al, As [PAZZ] [STAT	is and if resident code and I of memory used to eare serven NAMES*, vol. 17** 5* THE WEST STATES OF THE STATES OF	SETALL_VECTOR	MOV CALL. NOV MOV CALL RET PROC ME. MOV	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number jet interupt wactor jet replacement address
MERIT: HI TO ASCII MER ANT STRE LABBL STALLED SEGGEN MARKED PETTREE LI WE DORED VETTORS 0	ADD BEND BEND BETT FT DW 6 DH DH DH DH DH DH DH DH DH D	As, 1 Al_AM [BAZZ] CH_IF_TRANTIEV ID DID CH_IFF_TRANTIEV ID DID CH_IFF_TRANTI	is and if resident code and I of memory used to eare serven NAMES*, vol. 17** 5* THE WEST STATES OF THE STATES OF		MOV CALL. NOV MOV CALL RET PROC ME. MOV	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number iget interrupt wanter iget caplacement sidroms
MATT: MA	ADD BEND BEND BETT FT DW 6 DH DH DH DH DH DH DH DH DH D	As, 1 Al_AM [BAZZ] CH_IF_TRANTIEV ID DID CH_IFF_TRANTIEV ID DID CH_IFF_TRANTI	is and if resident code and I of memory used to eare serven NAMES*, vol. 17** 5* THE WEST STATES OF THE STATES OF	INSTALL_VECTOR	MOV CALL. NOV MOV CALL RET PROC ME. MOV	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number iget interrupt wanter iget caplacement sidroms
ERIT: #_TO_ASCII HER #_TO_ASCII HER #_TO_TO_ASCII HER #_TO_TO_ASCII HER #_TO_TO_ASCII HER #_TO_TO_ASCII HER #_TO_TO_TO_ASCII HER #_TO_TO_TO_TO_TO_TO_TO_TO_TO_TO_TO_TO_TO_	ADD BEND BEND BETT FT DW 6 DH DH DH DH DH DH DH DH DH D	As, 1 Al_AM [BAZZ] CH_IF_TRANTIEV ID DID CH_IFF_TRANTIEV ID DID CH_IFF_TRANTI	is and if resident code and I of memory used to eare serven NAMES*, vol. 17** 5* THE WEST STATES OF THE STATES OF	SETALL_VECTOR	MOV CALL. NOV MOV CALL RET PROC ME. MOV	#1, OFFSET ACCS, 18798 10, OFFSET 18798 1507DALL_WECTOR 1507DA	iget rector number iget interrupt wanter iget caplacement sidroms



Editor's Choice. 1988

"Superpowerful, supereasy, superfast, Q&A Write is superessential if you need a professional word processor that doesn't require hiring a personal trainer. It has all the answers."

Carol Olsen Day/PC Magazine, 2/88



Word Processor, 1987 "Between Q&A Write and PFS: Professional Write, we prefer Q&A Write ... John Lombardi/InfoWorld, 10/87



EASY-TO-USE WORD

On February 29, 1988 PC Magazine published the most comprehensive word processing comparisons ever undertaken. Q&A Write was rated higher than PFS: Professional Write...it earned an Editor's Choice. On October 12, 1987, InfoWorld magazine evaluated seven "Executive Word Processors" including PFS: Professional Write. Q&A Write was again "The Best.

In review after review, comparison after comparison, Q&A Write continues to amaze the critics with its unique combination of power, flexibility, and ease of use. And now with a simple phone call, you can check it out for

Call us today, toll-free and we'll send you an unbiased, "Expert Testimony" package including highlights of the PC Magazine and InfoWorld articles, reviewers' quotes, and actual user testimony. And as a bonus to the first 10,000 callers, we'll send something even better: a complete, working trial version

(regularly \$9.95) absolutely free. Professional Write or Q&A Write? With expert testimony, an easy-to-use checklist, and the real McCoy to try on your own computer, the "write" decision is #1. O&A Write.

Call (800) 888-0886 Ext. 439P to decide for yourself.

The #1 Executive Word Processor

Write

SYMANTEC. Of Wine suggested rotat in \$200 institution of the control of the contr

UTILITIES

H (for Hex search) performs the same service for all of memory as the DEBUG S command does for a specified range. When the prompt "Hex search string" appears on the bottom line, type the hex values you want to locate and hit Enter. Each byte must be represented as two digits and. optionally, may be separated by spaces into groups of two. For example, 6A4D will be interpreted by the program as the two values 6A 4D, and not as 6 A 4 D.

If you separate your entries with

spaces, you can enter up to seven pairs; without the spaces, the limit is ten pairs. If you do not enter the hex values in a valid format, RAMVIEW ignores your input. After you enter the hex values, RAM-VIEW searches for a match, starting at the current memory location. As with the AS-Cll search, if a match is found, that location is displayed. Otherwise, you end at 0000:0000. Use Goto to set RAMVIEW to the location where you want to start before using either search command.

The Up Arrow, Down Arrow, PgUp, PgDn, Home, and End keys are used to move through memory. The Up and Down Arrow keys move through memory a line (16 bytes) at a time. PgUp and PgDn move a screen page at a time (378 bytes). And Home and End display the start and end of the PC's IMB memory space.

If no other TSRs using the same vectors have been loaded after RAMVIEW, you ean uninstall it by typing RAMVIEW again at the DOS prompt.

you separate your entries with using either as

题》。 200 年 6 月 200 年 7 日 200 年 7 日 200 日 2 DATE A DA

RAMVIEW.BAS: A BASIC program that will automatically create RAMVIEW.COM.



ou know what you're looking for in an accounting system. Power. Flexibility, Ease of use, Nov. Peachtree Complete II: The Business Accounting System offers more. More features. More

functions. And an enhanced user interface that not only looks great, but makes accounting easier and more efficient than ever before. All at a and more enticent than ever before. As as a price that's substantially less than you'd expect The first Peachtree Business Accounting System sold for \$4,800. Now at just \$199, Peachtree Complete II is a value you can't afford to ignore

More Power, More Flexibility. We cut the price, but we certainly didn't cut corners. Today, Peachtree Complete II: The Business Accounting System is the most comprehensive accounting system you can huy at virtually any price. We've made enhancements to each of the eight modules that make up Peachtree Complete II. You can use them individually, or integrate them for maximum control and efficiency. You can even distribute them among separate computers. Over 250,000 Peachtree customers have already put these modules to work in their businesses

•	General Ledger
	Accounts Receiv
	Invoicing

· Payroli Inventory · Fixed Assets · Iob Cost

More New Features. Peachtree Complete II has a hrand new look and an entire range of state-of-the-art features to make your accounting procedures easier and more effective than you thought possible. Peachtree's Complete II's

Windows and Pop-Up Menus make it easy to see what you're doing and where you want to go next. When you get ready to make a choice, just "aim and shoot."

Smart HELP on-line, all the time. One keystroke gives you a pop-up rescue window full of context-sensitive information.

Oulck and Easy Error Handling gives error sages in plain English along with suggested solutions. No more complicated error codes. ET Enhanced Report Capabilities. Range printing allows you to print only what you need, only when you need it. A great feature for starting and stopping long reports. And now Complete II can produce over 450 reports.

M Increased Numeric Capacities to \$999,999,999.99 in key areas. Plus, an nited number of companies. Ongoing Tax Updates. Complete II allows you to update your accounting

tax files or you can order updates directly from Peachtree. Service Invoicing, the perfect addition to our product invoicing. Enter

information free form on service invoices or store predefined paragraphs. "... best documentation ... superb manuals

... bead and shoulders above the manuals More Confidence. Peachtree Complete II in-

for other low-priced systems ... "

cludes comprehensive documentation to get you started and help you along the way: a separate quick-start Installation Guide, Accounting Primer, eight-volume Reference Library, and extensive CIRCLE 358 ON READER SERVICE CARD

Call Now to Order or for a Dealer Near You 1-800-247-3224 in Georgia, call 1-404-564-5800

MORE COSTS LESS

PEACHTREE COMPLETE™ II:

Complete Accounting Is Still Just \$199.

COMPARE FEATURE FOR FEATURE

Over 450 reports Unlimited number of

Supports average, list purchased and standard cooling methods by to 19,500 inventory items (SEL's) Automatic price change on multiple items by percent or amount ard Assets Handes 11,000 assets and 13 methods of depreciation Updated to handle current tax is

Tracks crots and profitability on a job-by-job basis
 Compares estimated costs with actual costs for specific tasks

User modifiable (an tables will apdates published regularly b Pracharee Software

Tutorials on each application—all at no extra charge! Plus, we stand behind all our products with a toll-free hotline for technical support (\$1 per minute, \$20 minimum) and an established network of support centers across the country

More Satisfaction or Your Money Back More Satisfaction or Your Money Back We stand behind all our products with a 30-day money-back guarantee when you buy directly from Peachtree. If you're not satisfied, simply return the product in saleable condition within 30 days and receive a prompt refund. (A \$20 restocking fee applies to all returns.)



Less Money. Peachtree Complete II gives you more for less. More power, more flexibility, more features, more options, and more confi-dence for a low, low \$199. Call today to begin enjoying the benefits of Peachtree Complete II, the accounting system you can count on "The wide range of modules, low price,

and solid documentation make this a

top choice."*

More Power with PDQ II and Timeslips. Extend the power of Peachtree Complete II with Peachtree Data Query II. PDQ II lets you transfer your valuable Peachtree accounting information to Lotus 1-2-3°, dBASE® and other databases and spreadsheets for fur-

ther analysis. Plus, PDO II allows you to create custom reports such as invoices and statements. All for just \$199.

And now Peachtree Complete II is compatible with Timestips® III, a leading time and expense tracking program. With Timeslips III Accounting Link (TALP), you can integrate your time and hilling with your Peachtree accounting for total efficiency. Order Peachtree Complete II with Timeslips III now for just \$399 and receive TAL (reg. \$79.95) FREE *AufoRivid, December 1987

Handware Specifications: Requires PCNS-DOS version 2.0 or higher with 384K of unable memory and a minimum 10 MB hard disk. For use with the BM® PC, PCXT, PCxG. Personal Systems/270 and compatibles. 34" media optionally variable.

Ions 52.5 is a registered trademark of Lotas Sevelapment Cor-ration CRASE is a registered trademark of Ashbos Tare Cooperat University and Time-Link Plus III are trademarks of North Edge Sciences Copy 2004 is a registered trademark and Personal Syste is a trademark of International Business Machines

To Order by Mail, Add \$12.50 Shipping and Handling and Send 10: (to Georgia, and applicable rates tax

Peachtree Software 4355 Shackleford Road, Dept. PCM, Norcross, GA 30093



NEC introduces the monitor as big as an engineer's imagination.



MultiSync XL

Breakthrough

MultiSync technology

for CAD.

Whether your big ideas take the shape of skyscrapers or screw threads, you'll find the new MultiSync® XL the perfect monitor to display them. Especially when it's used with the graphics board that was designed to make the most of it: the MVA 1024 from NEC. Together, they give you the brilliant resolution and CAD capabilities your ideas deserve.

The XL gives you a reduced-glare 20" diagonal CRT on a tilt-swivel base, for a larger viewing area and greater comfort.

And it works with a wide variety of systems from PC/XT/AT/386 to PS/2 to Mac II. The MultiSync XL automatically adjusts its scanning frequency from EGA to VGA, and on up to even higher standards with our MVA 1024 in AT/386 based machines.

So, to create brilliant CAD ideas, get the MultiSync XL and the

MVA 1024. Two big ideas in themselves. For literature or a dealer

call 1-800-447-4700. For technical details call NEC Home Electronics (USA) Inc. 1-800-NEC-SOFT.

CaC



ITILITIES

SEGMENTED MEMORY Since you can now pop into memory at the touch of a key, you may want to have at least a general idea of where you are and what you're looking at. So, first, let us briefly discuss the memory addressing scheme used by the Intel processors in your machine.

The 8086/8088 microprocessor in an IBM PC can directly address IMB (1024K) of memory. In hex digits, the adversing range of the processor is 0 to FFFFFh. The value FFFFh, however, requires 20 bits in binary. That 's 4 bits more than will fit in the 16-bit registers of the 8088. (The 80268 and 80386 chips default to 8088 emulation mode and so have the same initial addressing configuration.)

To provide access to the full 20-bit range of a 1MB address space, therefore Intel uses a two-register scheme to identify each memory location. When used as a pair, these registers are said to contain the segment and offset parts of the address. By adding these registers in an adjusted manner, the actual (or absolute) address of a memory location is obtained.

The 8086/808 addressing scheme adjusts the registers before adding them by the sessional pitts the segment register always has a zero following its value. Thus, if the segment register contains 1000h and the offset register contains 1000h, the absolute address is 10000h, the absolute address is found to contain 245th and the offset register contains 245th, the absolute address is 23450h + 5432h = 28882h.

The conventional way of expressing memory addresses in terms of segment and offset values is to separate the two values with a colon. For example, 1000:0100h indicates the memory location addressed with a segment of 1000h and an offset of 0100h. This is the absolute memory location 10100h.

One of the more interesting side effects of this principle is that any one absolute address can be described by different segmentoffset combinations. For example, the location 10100h can be addressed as 1005:0050h, 1001:0090h, 0FFF:0110h, and 4,093 other possible combinations.

A RAM ROAD MAP The PC's memory organization is shown in the table in Figure 2. While not as detailed a map as you could

find elsewhere, it does provide enough information to begin your snooping. When your curiosity gets the better of you and you want a more comprehensive memory map, try one of the many popular PC books, such as Peter Norton's Inside the IBM PC.

Looking at the map, you'll immediately see that certain areas, such as the interrupt vectors table, are reserved for system use. Other areas are reserved for system memory and system ROM. The user memory area is located between the DOS data and screen memory areas. The BIOS data and screen memory areas. The BIOS data and screen memory areas. The system files, and file buffers are all located in this area, as are any programs loaded by the user.

THE RAMVIEW PROGRAM The assembly listing of RAMVIEW is well commented, which should make it fairly selfexplanatory for programmers. Before

General Memory Map

of PC/XT/AT



Figure 2: Memory on a PC is allocated in sections according to purpose. elaborating on several routines, we'd like to make a couple of comments regarding the way in which the program is written.

Writing a useful program that is small enough to print in PC Magazine is quite a challenge. A lot of effort is made to keep the code size down. In writing commercial code, program size isn't quite as important. For this reason, we used a programming technique writing RAMVIEW that we generally avoid: passing values to a procedure in registers and not on the stack. This involves more overhead for the programmer, because he has to keep track of which registers must be preserved across calls. While faster and more compact, using registers can easily produce procedures that conflict with other procedures. While both the ROM BIOS and DOS use registers to pass their arguments, OS/2 passes

MEMORY RESIDENCY RAMVIEW was a relatively easy TSR to program. Because it uses very few system resources and performs no disk access, it doesn't need much code to avoid interfering with most other programs. The keyboard interput 9 is used to check for the hotkey and implement the pop-up logic. The BIOS video interrupt 10 is seeded to avoid

all parameters on the stack.

popping up when it is unsafe to do so. An interrupt 9 is generated by a dedicated microprocessor in the keyboard each time a key is presented or released. Because RAMVIEW is invoked by a keystroke, this is the logical interrupt to use to pop up. Whenever interrupt 9 occurs, the code hooked in by RAMVIEW looks for the selected hoskey. If the hotkey and the proper shift keys are present, RAMVIEW perclearing the hotkey from the keyboard microprocessor and disabiling interrupts to ensure that it can't be dissurbed unexpectedly.

When RAMVIEW gets control, it checks a flag byte (labeled BUSY) that it uses to signal either that it is already invoked or that it is unsafe to pop up. If the BUSY byte has a nonzero value, RAMVIEW exits with an IRET. This has the same effect as if the hotkey was never pressed.

If the BUSY byte is zero, RAMVIEW sets that byte to nonzero to indicate that it's



Big savings *plus* a 6-Utilities Disk—FR

Guarantee delivery of more product reviews and camparisans than you'll find in any other PC-ariented publication with a subscription to PC MAGAZINE—for less than \$1.19 a capy!

Plus as an extra banus, you'll get an amazing Utilities Disk-absalutely Free! Here are 36 tested utilities that will turn you into a power-user instantly. This disk is not available in any stare, but it's yours free with your paid subscription to PC MAGAZINE.







Send me my FREE UTILITIES DISK and begin my subscription to PC MAGAZINE for:

- Two years (44 issues) for \$51.97 Less than \$1.19 a copy! Save \$1.76 off the newsstand price!
- One year (22 issues) for \$31.97 Less than \$1.46 a copy! Save \$1.49 off the newsstand price!

Savings based on newsstand price of \$2.95 per issue. Your Free Disk will be shipped upon receipt of payment.

Mr./Mrs./Ms		
Address	Please print full name	4SV49
Company		
City		
State	Zip	
Payment enclosed.	Bill me later.	

Add \$37 per year for postage outside USA, US currency only. Please of



Send me my FREE UTILITIES DISK and begin my subscription to PC MAGAZINE for:

- □ Two years (44 issues) for \$51.97 Less than \$1.19 a copy! Save \$1.76 off the newsstand price!
- One year (22 issues) for \$31.97 Less than \$1.46 a copy! Save \$1.49 off the newsstand price!

Savings based on newsstand price of \$2.95 per issue. Your Free Disk will be shipped upon receipt of payment.

Mr./Mrs./Ms	Mease print full name	
Address	Please print full name	4SV46
Company		
City		
State	Zip	
Payment enclosed. Send my Free Disk now.		

Add \$37 per year for postage outside USA. US currency only. Please allow us to 60 days for delivery of first issue. Basic arrued subscription price is \$44.92.

Get Your FREE DISK



Just send in ane of these cards taday. You'll get PC Magazine delivered right to your door for less than \$1.19 and issue—plus you'll get our Exclusive Utilities Disk-FREE!

This Free Disk is crammed with 36 ultra-pawerful utilities that will speed up your keyboard—locate any file in seconds—book up all your data with ease— re-execute screens af tharny DOS cammands with a single keystrake, and mare!

Dan't miss this chance to get the news and reviews you want in PC Magazine at these law, 60% OFF New Subscriber prices. And dan't miss aut an this remarkable free Utilities Disk. Send in your card naw!

(See other side for details)

36 POWER-USER UTILITIES -



BUSINESS REPLY MAIL

FIRST CLASS PERMIT #66 BOULDER, CO

O. Box 51524 oulder, Calarada 80321-1524 POSTAGE WILL BE PAID BY ADDRESSEE

BUSINESS REPLY MAI

POSTAGE WILL BE PAID BY ADDRESSEF FIRST CLASS PERMIT #66

UTILITIES

RAMVIEW BY MODEM

he programs published in PC Magazine are available by modem from PC MagNet, an on-line service through which readers can discuss the columns with the editors

To join PC MagNet, set your communications software for either 300 or 1,200 bits per second, 7 data bits, even parity, I stop bit, and full duplex. You can use any of more than 300 local access phone numbers, including: Boston, (617) 542-1796; New York, (212) 422-8820; Chicago, (312) 693-0330; or San Francisco, (415) 956-4191. To find the number nearest your dialing exchange or for 2,400-bps service, connect with PC MagNet and type GO PHONES. For Customer Service, call (800) 848-8990; in Ohio and outside the United States, call (614) 457-8650.

When you connect with PC Mag-Net, press Ctrl-C. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and enter Z10D8814 at the ENTER AGREEMENT NUMBER

PC MagNet costs \$12.50 an hour for 1,200/2,400-bos service and \$6 for 300 bps, via MasterCard, VISA, or American Express. There is no additional charge for downloading source code or compiled programs from PC MagNet. These programs can be copied but are copyrighted and are made available only for noncommercial use. You may make copies for others as long as no charge is involved, but making copies for any commercial purpose is strictly prohibited

RAMVIEW.COM is already compiled and ready to run, RAMVIEW BAS will automatically create RAM-VIEW.COM when run once in BA-SIC. RAMVIEW. ASM allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft. Version 2 or later) and the following commands:

MASM RAMVIEW: LINK RAMVIEW:

PYPTRIN PANNITPU PANNITPU COM Photocopy this page. Trim and holepunch the copy and add it to your DOS



RAMVIEW Command

Frank Dever and David Thomas

1988 No. 14 (Utilities)

Provides pop-up display and string searches of RAM contents, in ASCII and hex, from within an application.

Purpose: Format-Remarks:

[d:][path]RAMVIEW

RAMVIEW is a memory-resident utility that may be installed either at the DOS prompt or as a command in an AUTOEXEC.BAT file. Its default hotkey is Alt-R, and it will pop up in any text mode that is at least 80 columns wide. To exit RAMVIEW and return to your application. press the Esc key. Executing RAMVIEW a second time uninstalls the utility if no other terminate-and-stayresident (TSR) programs have been loaded after it.

RAM addresses are displayed both in absolute and in conventional segment offset form. The G (Goto) key is used to display the contents of memory at a specific address

Pressing A or H allows entry of an ASCII or hexadecimal search string of up to 20 characters. When using Hex entries, each byte must be represented by two characters. The bytes may be separated by a space. Pressing Enter starts the search beginning at the current memory location. To scan for the next match, press N (Next). When no more matches are found, the address is reset to 0000:0000.

The Up and Down Arrow keys are used to shift the memory display by one line (16 bytes). PgUp and PgDn move the display by a screen page (368 bytes). The Home and End keys set the memory display to the beginning and end of the 1MB address space.

Instructions for changing the default Alt-R hotkey are contained in the article, as is a table showing the main memory areas of the PC/XT/AT.

Improving on WordPerfect 5.0, the newest release of the world's No. 1 selling word processor, is a tall order.

But that's exactly what happens when you run

How Do You Impro

Network Card Plus. Because if you

butes as you type. With WordPerfect

EDITING WITH WORDPERFECT 5.0 AND HERCULES RAMFONT

Small fonts, large fonts, still larger fonts and many other attributes
can be generated with VordPerfect 5.0.

If you run WordPerfect 5.8 with Hercules RamFont (available only on the Hercules Graphics Card Plus, Network Card Plus and InColor Card), you see what you're going to got as you type. It isn't necessary to move to the document preview capability to verify what your document will look like.

SMALL CAPE. Subscript. Mormal. Superscript. Fine font. Bold small font. Large font. Cery large font. Extra large font. Itelics. Underline. Bold. Outline font. Rouble_underline. Strtkcost. All displayed together.

Hercules RamFont lets you see how your WordPerfect 5.0 document will look, even while editing.

WordPerfect 5.0 with Hercules RamFont-available exclusively on the Hercules Graphics Card Plus, Hercules InColor Card, and the Hercules

have Hercules RamFont, Word-Perfect 5.0 lets you prepare reports and presentations with multiple type styles, font sizes, and other attri-

5.0 and Hercules RamFont, preparing presentation graphics, newsletters, and other graphics-intensive documents becomes a part of the word

ve On Perfection?

processing process.
And there's no
need to bring in
additional software, or systems,
or people to run
them—to produce
terrific-looking
work.

Work.
You can edit with
up to 12 different
character styles at
the same time. And
you can use boldface, italics, superand sub-script,
strikethrough,
underline, double
underline, and
small caps.

What makes all this so easy is that, when you have RamFont, you can see what your work will look like, on-screen, as you enter and edit text. What you see is what you get!

WordPerfect 5.0 incorporates a document preview capability, which shows type sizes and fonts on-screen. But with RamFont and only with RamFont—you don't need to switch over to this preview capability to see what you're going to get—or switch out of it to make a change in text.*

In short, there are now more reasons than ever to use the world's No. 1 selling word processor.

And to get

And to get the most out of WordPerfect, you'll want Hercules RamFont too.

For more information, call Hercules toll-free at 1-800-532-0600 ext. 404(U.S.) or 1-800-323-0601 ext. 404 (Canada).



Wordl'erfect

UTILITIES

been invoked. The program then makes a final check to determine if the computer is in a text video mode that is at least 80 columns wide. If the computer does not meet these criteria, RAMVIEW clears the busy byte and exits; otherwise, it proceeds to its main routine.

Interrupt 10h is used by the system to perform video UN. RAMVIEW intercepts this interrupt so that it can prevent itself from being invoked while the interrupt is in use. Interrupt 10h is not reentrant, so it must be allowed to run to completion once it starts. By setting a flag when the interrupt is called and resetting it just before the interrupt is exited, RAMVIEW ensures that it will never come up while the interrupt is active.

If you're familiar with other discussions of memory residency, you'll notice that RAMVIEW doesn't use the DOS critical flag (also known as the INDOS flag). This is a byte in low memory used by DOS

to indicate that it is in an uninterruptable state. It is not necessary to use this flag, because RAMVIEW doesn't use any DOS routines!

CUSTOMIZING THE HOTKEY The default Alt-R hotkey used to pop up RAM-VIEW can be changed easily. If you're working with the assembly source code,

SHIFT	_MASK	Valu	e T	able
[At]		••	•••	••••
Cod	•••	••		•••
L-Savit	••	•	••	•
R-Shift			•	
SHIFT MASK Vide	012348	7.0	A 8 (CDEF

Figure 3: To change shift key combination, replace the current value with one shown. two equates at the beginning of the listing, labeled SHIFT_MASK and HOTKEY, To change the combination of shift keys, replace the current SHIFT_MASK value with the desired value from the table in Figure 3. For example, to change the CHES, use a value of 1 for SHIFT the combination of shift keys, replace the current of the SHIFT through the combination, replace the HOTKEY value with the scan code for the desired key from the table in Figure 3.

If you're starting with the .COM version, use DEBUG to make the changes. The following example illustrates how to change the hotkey to Ctrl-X:

DEBUG RAMVIEW.COM E 167 "Ctl-X" E 31D 2D ;Scan code E 327 84 ;Shift Mask W



It's a good idea to keep a copy of the original program before modifying it with DEBUG. If you make a mistake, just enter "O" to quit DEBUG and start over with the original.

PROGRAMMING TECHNIQUES The screen-handling functions of RAMVIEW include the ability to save the foreground screen contents, cursor type, and cursor location, as well as the functions necessary to display RAMVIEW. To achieve maximum speed in its screen displays, RAM-VIEW writes directly to screen memory. This technique produces "snow" on some CGA display cards, however, so RAM-VIEW turns off the CRT while writing to screen memory on CGA cards. The CRT is not turned off for monochrome, EGA,

Keyboard Scan Codes for Alternative Hotkeys

Figure 4: Use a value from this table to change the second key of the hotkey combination.

or VGA adapters. There is nothing unusual in the way RAMVIEW recognizes commands. The program calls interrupt 16h with AH set to zero to get a key. The key's scan code is returned in AH, while the key's ASCII code is returned in AL. RAMVIEW then falls through a series of comparisons to identify the key. If a match is found, the appropriate procedure is called to perform the command

The most difficult part of the Goto command is the input routine used to get a memory address. This same procedure is also used to get the hex and ASCII search



INTRODUCING CARBON COPY PLUS VERSION 5.0

features that improve Carbon Copy's functionality and performance while maintaining the performance and dependability that you've come to expect from the leader in remote control software.

EGA, VGA, Hercules" and PS/2" graphics to interact with each other. . BACKGROUND FILE TRANSFER lets you easily transfer files in the background

without exiting from your current application. . MOVEABLE CHAT WINDOWS lets you display both chat windows and an ap-

plication screen at the same time. You can also move the chat windows to diferent positions on the screen to avoid interfering with the application. · OTHER FEATURES, including novice user mode, memory resident

removal, online installation and improved documentation, make Carbon Copy Plus easier than ever to use.

If you've never used Carbon Copy Plus before, you've waited long enough-version 5.0 is the best ever! And if you are already a Carbon Copy Plus user, call us today to find out about our upgrade program.

MERIDIAN TECHNOLOGY INC

trvinc, CA 92714 (714) 261-1100

mark of Mention Technology. All other products referenced are trademarks of their respective companies. CIRCLE 228 ON READER SERVICE CARD

New 4.0 Version! **Now directly** import your dRase III files.

Master your mailings in minutes LetterMaster™

Client Management / Mail Management

4:30 "Susan-Send our sales letter to all buyers of apples and cherries in Washington and oranges or bananas in Florida, in time for today's 5:00pm pick-up.-Mr. Wermer.99

4:32 Mailing lists sorted.

4:33 Lists merged and purged.



- Our new LetterMaster mailing software is a lifesaver. It sorts any list according to any criteria in its own internal database and our dBASE® III files.
- LetterMaster merges lists and purges duplications in a matter of seconds. It's incredible! I can create instant custom mailing lists with a few keystrokes!

4:38 Personalized sales letters printed.

4:41 Labels printed.



With LetterMaster, all I do is name the list, name the letter, activate the printer, and "go do." It's that simple!

LetterMaster prints off any list onto leading brand address labels. It prints Rolodex cards and file folder labels, too.

LetterMaster operates with all

the popular word processing programs. About the only thing it

doesn't do is lick the envelopes!

Only \$189

4:45 Mailing complete and ready for pick-up.

5:00 66 Susan-Good work on that mailing.



Have an apple. —Bob³

Charge to my | Yea | Nevertiard | A Credit Card #. and Hitt for deposit and banding to hear of Brown and "It sales has Copper the ad-Aprili per jangran and maler y drawn on a 1.75 bed.

LIMITED OFFER CALL FOR OUR FREE

■ UTILITIES

strings. To provide the necessary flexibility, the following parameters must passed to the input routine: the row and column location where input is to start, the input string length, the replacement character for backspacing, the prompt string that precedes the input area, and a template through which input characters are filtered.

SEARCHING AND FINDING After an ASCII search string is nettered. Rating is nettered as ASCII search string is nettered as search in the string is nettered. Rating string the SCASB instruction. If the first character is found, then the remaining character in the string character is five such string are compared with the following characters in the moreover, using the Characters in memory, using the Characters in memory, using the Characters in memory, using the Character is merchange, used the provided by the 8088 produce small and fast code.

The 8088 string instructions can be dif-

ficult to understand because the terminating conditions are confusing. When the REPNZ SCASE or REP CMTSB instructions are used to find a match, and canning direction is forward, the processanting direction is forward, the processant the tree than the control of the control of

If the search is unsuccessful, the CX register is set to zero, the flags are set to incide a nonzero condition, and the DI and/or SI registers are set to point at the byte after the last compared location. The SEARCH_MEM procedure in RAM-VIEW is a general search routine that you can use to search for a string of any length from 1 to 65.53 characters.

If the search is for a hexadecimal string, the spaces will be stripped out and the string will be converted from ASCII hex to binary. The binary string will then be

searched for in memory in the same way as an ASCII string would be.

UNINSTALLING RAMYLEW You can remove RAMVIEW from memory by ex-ceuting it a second time at the DOS prompt. Before removing itself, it checks to see that no other program has modified the two interrupt vectors that must be resorted. If not, the original vector addresses for interrupts 9 and 10h are restored, and then the memory occupied by the program

is released back to DOS.

Spelunking in memory can be fun if you have the right tools. Memory resident, small, and fast, RAMVIEW lets you check under the hood of your PC without getting your fingers dirty.

Frank Dever and David Thomas are the founders of WindowDos Associates, a software development firm located in Arlington, Texas.

Travel Companions.

The WorldPort 2400 ⁵⁵⁸ and the WorldPort 1200 ⁵⁵⁸ moderns are the perfect travel companions for your portable computer. They work virtually anywhere in the world, including hotel rooms and phone booths, allowing you to connect in a few million more locations than other moderns.

With features superior to internal units, the WorldPort line of moderns is the smart choice for all your communication needs. WorldPort moderns operate from their own internal battery drawing no power from your Japopo. Cutting edge technology brings you features such as Bell and CCTT standards, direct connect and soostic interface (300 and 1200 bps), tiny size and a tiny price. The WorldFort 1200 "can be easily upgraded to 2400 bps and both the WorldFort 200" and the upgraded come with Carbon Copp PLIS" communications software.

Find out more about the travel companions that won't tie down your portable computer. Call us

today for more information about the WorldPort line of modems, or the name of your nearest dealet, at 800-541-0345. (In New York, 516-261-0423.)



Touchbase Systems, in 160 Laurel Avenue Northport, NY 11768 (516) 261-0423 TELEX: 6502848020 FAX: (516) 754-3491

Part 1200 and Workfloot 2400 are instanced and Tourishana Sustains for Carbon Conv. DLIRS is a instanced of Manifel to Tourish and Sustains and Sust

UNBELIEVABLE HARDWARE SPECIALS

PC TURBO EXPRESS XT Fully loaded! Fully IBM Com-

patible. Fast NEC V20 CPU (more than twice the processing power of a standard 8088), 512K (expandable to 1024 RAM), 4.77/8 MHz speed, FCC Approved, Clock/Calendar, 2 Parallel Printer Ports, 1 Serial Port, Game Port, AT-Style Keyboard, 8 expansion slots, 1 floppy disk drive, 1 20 Megabyte Seagate Disk Drive with control-ler, Hercules compatible graphics card, Samsung or Magnavox monitor included...\$995 or \$99.97/Month (1 Year).

PC TURBO EXPRESS AT Fully loaded 80286-10 AT Compatible with 12 MHz Speed and 16 MHz throughput, FCC Approved, 512K RAM (expandable to 1024K), Clock/Calendar, Parallel Printer Port, 101 key AT-style keyboard, 8 expansion slots, fast 40 Megabyte Seagate hard disk drive with controller, Samsung or Magnavox monitor included ... \$1799 or \$79.97/month (3 Years).

386 SUPER TURBO EXPRESS Fully loaded 386, 100% IBM Compatible, 80386-16, 1024K RAM on board, fast 80 ms Seagate hard disk drive with controller, FCC Approved, Clock/Calendar, Parallel Printer Port, Serial Port, 8 expansion slots, 16 MHz speed and throughput, Hercules compatible graphics card, Samsung or Magnavox monitor included ... \$3495 or \$129/month (3 years).

Call for prices for other configurations and other hardware products. EPSON and Okidata printers, Toshiba Laptops, Novell, 3COM and other networks are available for purchase or lease.



PC EXPRESS SOFTWARE SPECIALS - WE BEAT THE COMPETITION!

Dac hasy Accounting 2 0	
Peachtree Complete Accusating	
Managing Your Money	
System	\$590
Timesles III (Time and Billing)	\$114
Cash Register Software	
Bracky Salon Accounting The Auto Repair Shop Controller	
The Auto Repair Shop Controller	\$796
VOOR PROCESSING DESITEP PROCESSING	
NEW WordFerfect 5 9	\$215

Publisher's PicturePak Collection for	
WordPyriget tall 3 Pakel	\$199
Microsoft World 4-9	5199
Multimate Advantage II	\$719
WordStar 2010 Plus	\$195
RightWriter (Crammar Checker)	
Crammatsk []	5 89
Byline	\$169
Pagemaker.	5442
Ventura	5469
PFS: First Publisher	. \$ 38
SPECIALISACET	
Letus I 2 J	_ \$299
Letus Ready to Run Accounting (G/LARA/PPayeoli Inventory)	\$199

Individual Lintus Accounting Nuclules as above A.R. A.P. General Ludger, Payroll, Inventory Quattro	\$ 49 \$ 60 \$128
PRODUCTIVITY TODAS	
Harvard Total Craphics	\$297
Q & A Write	
Sidekick Plus	
Easy Moose (as above, non-branded)	
PFS: Farst Choser	
Fuert Seel	\$ 50
PERCENAMING 10013	
GIANE IN Plan	\$37

PC Tooks De	Name	\$ 55
	anced Utilities	
	tor (translates dBASE	
	C	\$419
	(the perfect program	
editor for	real dBase programmers).	\$916
	well)	
XOL.		
	a Plus (Fox & Geller)	
	5.1	
	wickflasse 4.0	
	auc Comeder 6.0	
	ci Switms-CCI	
Mace Littleto		
	community Macanagh	

EXPRESS EXCLUSIVE HOT LINE

NEADY TO NOW ACCOUNTING WITH LOTUS 1-2-3 (Manusoft)

A completely integrated, full-featured, easy-to-run accounting system that works under full supprestly integrates, nun-resource, easy-to-run accommon years of the complete system eral Ledger. 509.55 Payroll sunts Receivable 549.95 Accounts Payable.

LANDLORG/LANGUASTER (Systems Plus)

The LAND.GOD is a complete property management system that prints benant statements, generates lease expiration lists, identifies late papers, produces wacancy reports, prints checks and performs all functions required for landfords and anyone who manages apartments, condominums, shopping centers or any commercial properties. 5506

The LANOMASTER contains all the features of the LANOLORO plus adds a complete double entry accounting system to the package for general ledger, accounts payable and accounts recovable. ... \$1250.

PROACOU-TURNS PARAGON (THE ACCOUNTING SPECIALISTS)

PRINCET THE PRINCET OF EXCUSION STREET, CONTROLLED THE PRINCET OF THE PRINCET OF

TURBO PARAGON contains all the features found in PARAGON plus JOB COSTING, EST MATING and a complete REPORT WRITER.

SNEWWIND Versieus of PARAGON are available.

NETHIL CASH REGISTER CONTROL (Microbia Corporation)

The MICROBEL RETAIL STURE SYSTEM is an extraordinary system for managing all retail store sales, customers and inventory. Quickly bill your customers, keep track for your inven-tory, commissions, look up prices, partic cash register receipts for complete invescess and perform all the day-to-day-functions required to acep you on top of your business and its cash flow its little to computerize... all for \$200. Optional add one to your Retail Store Software System ... a complete cash drawer that plug-into your ISM PC or compatible, a receist printer and bar code reader.

ystems are also available for Video Stores, Beauty Salons, Liquor Stores, Auto Repair hops and other vertical markets. IEI MACRES FOR LETUS 1-2-3 (Micropak)

IN BREESE FIR UIDS 1-c-1 perceptal

A 1895 SG it is beginn. If you see Louis 12-2, you can add word processing, is you up call

A 1895 SG it is beginn. If you see Louis 12-2, you can add word processing, is you up call

that is calculated interest, and a 1895 see Louis 12-2, you can add word processing to the control of processing the control of processi

Please call or write for our FREE 46 page full color catalog containing more than 100,000 hardware and software stems ready to be shipped. All prices and specifications are subject to change. Delivery subject to assisbability.

Add \$6 for shipping of the first stem (\$3 for each additional item) CIRCLE 304 ON READER SERVICE CARD

PC EXPRES: 1-800-DIAL-PC

OVERNIGHT SOFTWARE DELIVERY





PHONE: (914) 426-2400 FAX: (914) 426-2600 TELEX: 667962 (SOFT COMM NYK)

PC EXPRESS" PROGRAMMER'S WORKBENCH

dbase at the speed of c dBx Translates dBASE Applications to C

You dBASEIM programmers know what coreseve and reedable language dBASE is It's a very comfortable opment environment. But the price is debased performance. Even compiled dBASE doesn't offer the speed that some usern require these days. The land of spood offered by software written in the Clanguage. The arrawer is dBxTM, dBx translates dBASE to C. It offers you a major competitive advantage over the next dBASE programmer. Keep writing

Oher advantages C is portable, e to other operating systems like UNIX/ XenxTM To the Macantosh or Amica dBx gives your applications a passport to places dBASE carnot go Has its own file manager for single user, but linkstomajor C file managers — c-tree and dBC—for compatibility with iBASE files or multi-user support have everything you'll need, including

with Labrary Source Call for Full Source Pricing

in dBASE. Take every application all the way to completion. Then use dRx to translate them top to bottom to CI BRIEF/dBRIEF

Many worthy utility products supply needs that dBASE* is programming needs that dBASE* is programming lar grange doesn't —dUTL/M, dFLOW/M and a host of others. Trouble is, you have to use them separately, then combine their output into your dBASE program

es No longer dBRIEFTM, written in BRIEF's macro language, grabs hold of BRIEF and turns if into a complete dBASE Using BRIEF's underlying shell capabil-ties and its own interfaces, dBRIEF can run external utility libraries, plus dBASE itself, and link to the Clipper IM. Foxbase + TM and Quicksiver compilers all with dBRIEF still loaded and running the show. It can do what BRIEF already

The Power Environment for dBASE Programming

. Convert a screen layout into dBASE code for interactive data entry.

• Damlay dBASE file structures in windows, a great convenience alongiside your program files Expand losystroines into full dBASE

. Indent automatically for clogic caspay

Create databases, index lies, probe
Adaton Tate's dFORMAITM and
dCONVERTIM, draw lines and boxes
"Simply marvelous programming en-

varonment for writing and editing dBASE programs 7. PC Megazine, 7/86 Source code included! Requires BRIEF 132 or later and 384k 512k to run dBASE within dBRIEF, 640k and harddisk recommended BRIEF / dBRIEF Let \$275 Ours call

APPLICATIONS PLUS For dBASE

The Complete dBASE Compan Who says you can't have it all?
APPLICATIONS PLUS has ew An application generator (QUICKCODE PLUS) relational report water (QUICK

REPORT), and graphics system (dCRAPH) QUICKCODE PLUS offers classes of features you've never seen before in a dBASE code generator Relational appli onen or more databases simultaneously "Real-time" calculations, performed on screen as the user erretz each field. Forms up to 11 screens long, with the ability to page data between screens cally combine data from different data bases 9 Data types 16 field types

OUICKREPORT is a full-featured relaal report writer, which combines up to 6 databases in one report, handles many (like **bold** and *italics*), computed fields and up to 16 levels of totaling and sorting dCRAPH is a graphics system that pro duces bar, pie, line, and psebar charts directly from dBASE data. Dozens of opons let you tailor graphs to your needs APPLICATIONS PLUS is 100% compe-ble with Classes and FoxRASE+

Last APPLICATIONS

Ours PLUS QUICKCODE PLUS

MICROSOFT LANGUAGES

Powerful Implementations Of The Most Popular Programming Languages topary concept in BA

Microsoft C 50 The flagship of the Microsoft line runs up to 30 percent faster features deliver untouchable execution

speeds. 100 new additional library Microsoft MacroASSEMBLER 5.0 II ou ever wanted to take on the challeng of assembly, here's your opportunity. "MASM" 50 is a lot easier to use, has

new "Mixed Language" programming tions for linking your assembly code with ther Microsoft languages Microsoft QuickBASIC 40: is a revolu-

mary concept in BASIC programming It allows you to run, edit, debug, and run again. Our friends at Microsoft have elim

mated the dreaded compile step. Wi ever you edit your code QB4 automa tically incorporates your changes, so to it can run a program of 150,000 lines in Each member of this language family

des the renowned debucker Microsoft C ASSEMBLER
Microsoft QuickBASIC
Microsoft FORTRAN

\$150 \$109 \$ 50 \$ 66

NOVELL: BTRIEVE, XQL, XTRIEVE Sophisticated Tools Essential For Fast Database Handling records could have been used to pro

gram more important parts of your appli cation. Why not let XQL do it for you Bitneye as a library of subsoutnes that XOL will increase your program allows the programmer to build a data base application using any language. It takes complete charge of all file creation indexing, reading, writing, insertion, productivity and let you focus on building

The XOL system works in tandem with deletion, forward and backward search up. Its balanced tree indexing scheme Brieve and has an equally powerful chasse. No land on the number of finds any key in a million in less than 4 accesses. That's fact records per file. Max file size is 4 gign-bytes, Max record size equals 4K, Max indexes per file is 24. The one version works for single or multisaser systems. DOS Ver 3.0 or greeker. All languages Britine is multi-langual also it includes more than 20 language interfaces (includes ing C, BASIC, PASCAL, FORTRAN). However if it turns out that you are using

are supported

Xtneve is the final incredient in the Novell programming recipe it is a menu driven, data retrieval system, that allows conven, case reconver system, mar ascon-you to queckly find information and dis-play reports. System developers can easily customate. Xtneve to display com-mand menus, help fales, and error mes-sages in the English spoken by the custoner. Xtreve screens then gives menu choices that users can quickly recognize making Xtreve an easy product to use nd understand Report Option for printing customized

eports, form letters, mading labels & Bineve

XQL Xtneve/N Report Option/N

GSS GRAPHICS SYSTEM Leave the Device Driving to GSS

For sepous applications stick to the tools that stick to the standards. Not the least of reasons why GSSTM has emerged as the pre-eminent graphics toolmaker is that it has always conformed to ANSI standards.

As the heart of the system is the CGI standard Dovelopment Tooliot It has all language interfaces and device drivers for keyboards, mace, joyaticis, tablets, printers, plotters, cameras. The drivers completely assalate your application. om concern for device idiosyncracy CSS Kernel TM conforms to ANSI's CRS

something a little unusual, worry not. The manual includes a chapter on how to write a language interface to Bineve.

Brown's vital statistics are equally in

preserve Filesmay have up to 24 indexes, fixed record length to 4090 characters.

variable length to 64K, indexes to 255 characters, files of 4 billion bytes. Net

work support includes Novell, 3-COM, IBM PC NET, Software Lank's Multilink

ment system designed especially for programmers Imagine being able to ac your database with the ease of SQL

Ciructured Query Language) statements and still having the power to process that data right down to the byte level. Think about your applications A large part of your software development effort

is probably devoted to managing data stored in files on disk. Hours spent was ing lines of code to search and store data

XQL is a relational database m

and many others

2b and has all its drivers and language bindings Macro level tools to draw, colo segment, transform, store and recreate an object. The Metafile Interpreter reads ANSI CCM files with full CGI capabulty for recreation on various devices Quality software? IBM thinks so They sell OSS under their own label Royalbes Needs 256ir. Let Ours CGI Dylpment Toolks ernel for IBM RT

CLIPPER

R&R RELATIONAL REPORT WRITER

MORE PROGRAMMING TOOLS FOR...

dbase, C. Fortran, basic, COBOL, PASCAL dbc ISAM, FoxBASE, Greenleaf, Halo '88,

Logitech MODULA, MicroFocus COBOL, Norton Utilities, Panel Plus, Periscope, Phoenix, Polytron, RM/COBOL, Sprindrift, Tom Rettig's Library, Windows for Data, and many more.

Call or write for prices and information. CIRCLE 303 ON READER SERVICE CARD

PC EXPRESS 1-800-DIAL-PC

OVERNIGHT SOFTWARE DELIVERY



TELEX: 667962 (SOFT COMM NYK)

Switch on a serious surge suppressor.





With test after test proving that 70-90% of all PC malfunctions can be traced to power problems, a surge suppressor is the first accessory you should buy for your PC. But don't put your trust in just any surge suppressor. Get one that gives your whole system

superior protection. One that's engineered to the highest specifications. Get a Kensington Master

Meets IEEE 587-1980 Category A

Meets IEEE 587-1980 Category B

UL Listed

Piece® or Master Piece Plus.
They re the most popular
The right surge suppressor passes all the tests.
The dedicated to giving your PC the best possible protection.

That's why Master Piece and Master Piece Plus are equipped with our unique two-stage surge suppression circuit, containing a high-speed silicon semiconductor for the quick reaction nearly and heavy-duty metal oxide varistors for the brute force required to keep even the largest surges from penetrating into your system.

That's why the plus in Master Piece Plus is additional modern surge suppression circuitry to protect your modern from surges,

spikes and noise on the telephone line.

And that's why the circulity in both models can handle anything an electrical storm or your local power company can offer—up to 6,000 volts with a 3,000 amp follow-on current. (That's the kind of superior performance that passes not only U.I. testing, but Categories A and B of the strict IEEE'specification 587-1980 as well.) Now, this may look to you like we're taking more than the

necessary precautions. And actually, we are. But after all, isn't that

what you expect from a serious surge suppressor? Master Piece (\$149.95)

and Master Piece Plus (\$159.95). For more info, or a dealer near you, call (800) 535-4242. In NY (212) 475-5200.



PRESENTATION MANAGER MENUS



How to interface keyboard and mouse input with the Presentation Manager's internal window procedures by adding a menu to the BOXESI program presented last issue.

In the last Environments column I showed a complete OS/2 Presentation Manager program named BOXESI that draws a pretty pattern of nested boxes within its client window.

within its client window. BOXESI does not itself handle any keyboard or mouse input, and it contains no code that interents with the user. Despite that, the program certainly has a user interface. By using either the keyboard or the mouse, you can move BOXESI to any program's window, mantimate the window to fill the full screen, or minimize it to be disolated as a small from.

All this work is done for the program by the windows that the program creates.

A MULTITUDE OF WINDOWS Presentation Manager applications are built around objects known as windows, which occupy a rectangular area on the screen. Each window has a window procedure associated with it that determines what the window looks like by painting it.

The window procedure also processes input to the window. This input is in the form of structured messages. Some of this input is normal user input from the keyboard and the mouse, but other input comes from the Presentation Manager is-self. We saw last time how BOXESI learns that its window's size has changed when it receives a WM_SIZE message from the Presentation Manager.

You create a standard window in a Presentation Manager program by calling the WinCreateStdWindow function. The only window that is always created by WinCreateSulVindow is the frame window, but the same function is normally used to create several additional windows. These other, optional windows are "children" of the frame window and are positioned on its surface. In the BOXESI program these other windows are: the sizing border winments and the contract of the surface of the contract of the contract and the contract of the contract the contract of the contract the contract of the contract the cont

Each of these windows has a window procedure that processes messages to the window and paints it. For all the windows except the client window, the window procedures are internal to the Presentation Manager. The window procedure for the client window—the large internal area of the main window—is in the program that creates the standard window.

Now let's add another window to this

■ BOXES2 allows a user to change the background color and the foreground color (the color of the line) drawn by the client

window.

collection: a menu. The new program presented here, BOXES, allows a user to change the background color and the forground color (the color of the lines) drawn by the client window. The window procedure for the menu is internal to the Presentation Manager. The menu window procdure processes keyboard and mouse input to the menu and socials a message to the client window when the user selects a menu item.

MENU MECHANICS Figure 1 shows BOXES2 running under the Presentation Manager. You'll notice that the program's menu is positioned below the title bar and contains two options—Background and Foreground. This is often called the top-level menu or the menu bar.

When either of the two top-level items is selected, another menu is displayed (Figure 2). This is sometimes called a popup menu, a drop-down menu, or a sub-

In BOXES2, each submenul lists the 16 standard colors supported under the Presentation Manager. You'll notice in Figure 2 that the selected Foreground color (Black) has a check mark to the left of it. When you choose another color, that color becomes checked and BOXES2's client area is repainted with the new color.

You can choose menu items with the mouse or from the keyboard. Using the mouse, you position the mouse pointer (which looks like an arrow) over an option on the top-level menu and press the left button. This displays the submenu. You then select a color in the same way.

ENVIRONMENTS

Using the keyboard instead of the | key or the F10 key, the first option on the mouse to make your selections is also menu bar is highlighted. You can then straightforward. When you press the Alt | press Enter to view that submenu, or you

Boxes2

Figure 1: The BOXES2 program running under the Presentation Manager. The top-level menu is below the title bur

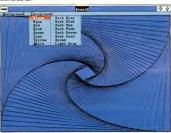


Figure 2: The submenu for the Foreground option lists the 16 standard colors supported by the Presentation Manager.

can use the cursor keys to move the highlight to another top-level item. When a submenu is displayed, you use the cursor keys to move the highlight among the items. Pressing the Enter key selects an item. Pressing the Esc key cancels the

menu selection

You'll notice in Figure 2 that a letter is underlined in some of the menu options. This provides still another keyboard interface. You press the Alt key (or F10 key). the underlined letter of the top-level item. and the underlined letter of the submenu item. For example, to create a red foreground, you press Alt. F. and R. This is quite similar to the fast menu selection in Lotus 1-2-3. (I hope that statement doesn't provoke another look-and-feel lawsuit!)

Obviously, if we had to write all the keyboard, mouse, and display logic for such a menu, our program would become quite large. But as you'll see, our program needs to be involved in only a small part of this whole process.

DEFINING THE MENU A Presents. tion Manager menu is usually defined in a special file called a "resource script." This is an ASCII text file that, by convention, has a filename extension of .RC.

The BOXES2.RC file is shown in Figure 3. It consists of two #include statements followed by the definition of the menu. The words MENU, SUBMENU, and MENUITEM are all resource script keywords.

The MENU keyword begins a menu definition. The top-level items are enclosed within a pair of curly brackets. You can use either MENUITEM or SUB-MENU statements for top-level menu items. You use SUBMENU for those items that invoke submenus (the most common case) and MENUITEM for those items that do not.

Each SUBMENU statement is followed by a series of MENUITEM statements enclosed in another pair of curly brackets. These are the items that appear on the submenu. (You cannot have submenus within a submenu; currently, the Presentation Manager supports only one level of submenu nesting.) The text in quotation marks following

the SUBMENU and MENUITEM statements is the text that appears in the menu.

Nobody Has More In Store Than Storage Dimensions.

More Experience, More Choices, More Support,



Nobody delivers innovative, high-performance storage solutions for today's high-end PC applications better than Storage Dimensions

In fact, with our expanding product line engineered for leading edge requirements, we're the fastest growing company in high-capacity (over 100 MB) PC mass storage.

We built our reputation with SpeedStor," the industry standard integration and partitioning software for DOS applications. But that was just the beginning. Since then our 500%

hardware product line has grown to encompass a wide range of plug-and-play 51/4-inch storage subsystems with

capacities from 115 to 1.144 megabytes. All offer unbeatable price/performance. SpeedStor hard disk

subsystems are designed for PC AT* and PS/2* systems running demanding PC-DOS applications. LANStor disk

subsystems provide exceptional performance for Novell* network fileservers, including support for NetWare* v2.1.

Without running COMPSURF. LaserStor" write-once optical subsystems are engineered for applications requiring large amounts of permanent data storage on removable cartridges With

proprietary LaserCache* software to increase speed and throughput.

Family		Range	Supported
SpeedStor	PC-DOS	120 to 330 MB	ESOL SCSI, ST412, RLL
LANStor	Novell NetWare	115 to 1,144 MB	ESDI, 503, 57412,008
LaserStor	Write-Once Optical (PC-DOS)	800 M8 Per Cartridge	SCSI
All are	backed	by the	

knowledgeable support and responsive service you expect. Including hardware and software technical support. Applications assistance. Comprehensive documentation. A full one-year warranty. And more.

Need More Information? Call (408) 879-0300 Ext. 801.

Call now for applications assistance, pricing and fast delivery. There's always more in store at Storage Dimensions.

More In Store

Imensions, 2145 Hamilton Avenue, San Jose, CA 95125. itor, LaserStor, LaserCache and LANStor are trademarks of Storage Deve



Affordable Networking

Just \$80 per PC Don't get trapped in a multi-user

world. With ExcellNET and your PCs, mainframe power is available on a desktop, without mainframe limita-· Preserves the single user, stand

- alone features of the PC, while allowing you to share information via file transfer.
- Eliminates costly LAN cables and expensive network interface cards.
- · Frees you from dedicated servers and network administrators.

Features Networks PCs, XTs, ATs, PS/2s

- and compatibles.
- File Transfer quickly, accurately
- and inexpensively. Share printers, plotters and
- peripherals.
- Modem support for world wide communications.
- Exchange data between 3 1/2" and 5 1/4" disks (allows laptops to share resources with desktops).
- Inexpensive RS-232 communications.



ExcellNET

The Excellent Network! Special Introductory Offer

2 PC Starter Kit (includes cables) Just \$180 EXCELLTECH, INC

112 1/2 W. 3rd St. Yankton, SD 57078 For orders and information call: (800) 553-TECH (8324) (605) 665-TECH (8324)

CIRCLE 525 ON READER SERVICE CARD

ENVIRONMENTS

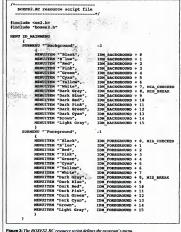
A tilde () indicates that the letter immediately following it is to be underlined. This is the letter used in the keyboard interface. Generally, it is the first letter or-if necessary to prevent duplication-another consonant. The select-by-letter system using the tildes is optional. If you do not include an underline, the user can still select the item from the keyboard by using the cursor movement keys

The words MIA CHECKED and MIS RREAKSEPARATOR are identifiers defined in one of the Presentation Manager header files. (This is why we need to

include the OS2.H file at the top of the resource script.) The MIA prefix stands for "menu item attribute" and MIS stands for "menu item style."

The MIA_CHECKED attribute causes a check mark to appear to the left of the menu item when the menu is first displayed. A program can then remove a check mark from an item and put one next to another item. I'll show how this is done shortly.

The MIS_BREAK style tells the Presentation Manager that it has to begin that item in a new column.



The identifiers ID.MAINMENU, IDM_BACKGROUND, and IDM_ FOREGROUND are defined in the header file BOXES2.H, which is shown in Figure 4. As you will see, these identifiers are aboused in BOXES2.C, which is why they're defined in a separate file rather than in BOXES2.G filest.

The ID_MAINMENU identifier is a number by which the program can refer to this menu. You can have more than one menu defined in a resource script file. You would simply give each a different ID number.

Each item that can be chosen by the user must be associated with a unique ID number. (By convention, items on a toplevel menu that invoke submenus are simply given ID numbers of -1.) When a user

BOXES2.H header file

#define ID_MAINMENU

#define IDM_BACKGROUND #x28

Figure 4: The BOXES2.H header file defines identifiers used in the resource script and the C source code file.

chooses a menu item, the menu window sends a message to the client window, which is how the program learns about menu selections. The ID number identifies the menu item that the user selected.

In BOXES2.RC, I've given the menu items consecutive ID numbers based on two identifiers—IDM_BACKGROUND and IDM_FOREGROUND—defined in BOXES2.H. (The IDM prefix stands for "ID for a Menu item.") For example, the

Brown option in the Background menu has an ID of IDM_BACKGROUND + 14. IDM_BACKGROUND is defined in BOXES2. H as 16 (actually, 0x10 in C's hexadecimal notation), so the ID number is 30.

COMPILING THE RESOURCES How does this resource script become part of the EXE file? That's the job of the resource compiler, RC.EXE, which was part of the April 1988 update to Microsoft's OS/2 Software Development Kit: RC will also

SIMPLY THE BEST VGA ADAPTER WINNER OF CADSOURCE PC GRAPHICS SHOOTOUT '88.

66 For the PC, no other VGA adapter matches the performance and enhancement capabilities of the VGA Extra/EM[®] with AutoCAD[®] applications, 37 Em Med Treatment, (AUS-uner)



STB Systems, Inc., P.O. Box 850957, Richardson, TX 75085-0957, 214/234-875

CIRCLE 517 ON READER SERVICE CARD



"If it's electronic mail capabilities you're after, we recommend cc:Mail LAN Package."

-PC Magazine, Editor's Choice Award, June 14, 1988

No wonder • Mail is the best-selling

PC E-Mail package for any

LAN, including IBM 3Com Novell

√1800-448-2500 for cM

1 toda

■ ENVIRONMENTS

be included with any future programmer's tool kit for the Presentation Manager. RC compiles the .RC resource script

into a binary format with the extension .RES, and it adds the compiled resources to the .EXE file. The command

RC -R BOXES2

compiles BOXES2.RC to create BOX-ES2.RES, the compiled resource file.

After you run LINK to create BOX-FS2 EXE, the command

RC BOXES2.RES

adds the contents of BOXES2.RES to the BOXES2.EXE file.The resultant BOX-ES2.EXE file is ready to run.

You can combine these jobs into one step by using the command

RC BOXES2.RC

However, during program development you'll find that the two-step method saves

CIRCLE 728 ON READER SERVICE CARD

time over the one-step method because you don't have to recompile the resources every time you recompile the C program and create a new .EXE file. You only need to add the already-compiled resources to

The resource compiler invokes the normal C preprocessor module, so you will be able to use C preprocessor statements (such as #include and #define) in the resource script. The resource compiler will skip over the C-style comments and will fold constants such as IDM_BACK-GROUND+14.

the EXE file.

CODE, DATA, AND RESOURCES As you know, most programs are made up of code and data. Of course! What else is there besides code and data?

As I noted in the last issue, however, the Presentation Manager is a little different from conventional systems. It is quite proper to say that a Presentation Manager program is made up of code, data, and resources. Several months ago 1 discussed how code and data segments are stored in the .EXE file ("Exploring the OS/2. EXE File," PC Magazine, May 17, 1988), Resource segments are stored in the .EXE file its like code and data.

Obviously resources are similar to data, but they are handled in a very different way from the data normally defined in a program. Resources are usually kept on-disk in the .EXE file until they are needed. When they are loaded into memory, they occupy their own memory segments, and these segments are read-only. If multiple copies of a Presentation Manager program are running, all the copies can share the same resource segments.

Each resource in an .EXE file is identified by a "resource type" and a "resource name" (both of which are numbers). The resource type for a menu happens to be 3. The resource name for the menu defined in



The Most Important Question You Should Answer Before Buying Any Single User Accounting Software Program.

As your business grows you need to add more integrated terminals to your system. Will your accounting software program have upgradeability to 3.1 DOS with complete record and file locking functions?

Multiuser processing is a completely different environment than the single user. The vast majority of single user accounting software programs are incapable of upgradeability to complete record and file locking functions. COUGAR MOUNTAIN'S ACT 1 was designed from inception to have upgradeability to 3.1 DOS, giving you unlimited growth potential. All data files are automatically upgradeable to the multiuser version.



ONLY Plus \$11.50 Shipping & Handling





Here's more reasons why ACT 1 has become the industry standard and why thousands of users are selecting, and changing to, ACT 1.

GENERAL FEATURES "LOOKUP" Windows throughout. Manu driven with 2 help references Multi company and report progrator

Complete audit trail All modules can post to multiple profit centers

Fully integrated with single source entry Oate sensitive user-defined fiscal calendar User defined financial reports User can design checks, invoices, statements & W-2s

User defined chart of accounts, account numbers & stock numbers up to 15 alphynumenous GENERAL LEDGER

Allows for multi company ledgers Unlimited multi-level accounts for departmentalized

Allows recurring journal entires User can process transactions 2 periods into next year. Allows budgeting

ACCOUNTS RECEIVABLE

Nows unapplied payments

Handles recurring accounts receivable Supports partial payments & finance charges. Allows unanobed credit memos Lip to 5 user-defined aging periods Making labels & reports with 7 different sorts.

INVENTORY Supports: LIFO, FIFO, weighted everages & standard Supports markup, margin or list

Allows up to 4 places to noht of decimal for unit cost SALES INVOICING

pports service or product oriented bus User defined tax tables including multiple sales taxes Prints packing slice Prints invoices

erts user to customer axceeding credit limit. Sales history reports

Autometic updating of inventory daily. Allows return credit memos. ACCOUNTS PAYABLE

Can post to 200 general ledger expense accounts per

Automatically prepares payments Supports partial and handwritten checks. Processes credit and debit memos.

PAYROLL

Generates automatic payrol Provides up to Russoudshood rates Allows distribution of payroll expenses to user-defined

Benefics and deductions are calculated on fixed Hourly amounts, percentage of pross or variety

Allows additions to gross which may be taxable. nontaxable or partially taxed. Handes 401K & cafetens. All tax tables easily updated by the user Handles payroll draws, per diem pay, contract & piece

work hourly and salary Handles to account

HARDWARE REQUIREMENTS

TO ORDER CALL (800) 344-2540 8:00-5:00 MST Monday-Friday UNCONDITIONAL 30 DAY MONEY

BACK GUARANTEE applicable on all products bought directly

from COUGAR MOUNTAIN SOFTWARE Products must be returned in resaleable condition. Restocking fee applicable

ACT 1 series is UPGRADEABLE to ACT 2 series which is multiuser for LANS & Networks. Data files are automatically upgradeable. Trademarks

MS - OOS Microsoft, Inc. PC - OOS IBM CIRCLE 194 ON READER SERVICE CARD

Technical support is available via our Toll-Free Telephone Number. Training seminars available.

To order by mail send \$139.50 plus \$11.50 S&H to:



2609 Kootenai, Box 6886, Boise, Idaho 83707, 208-344-2540

■ ENVIRONMENTS

BOXES2, RC is ID_MAINMENU, which is equal to 1. Although a program can be a resource directly from the .EW file using the DoxGetResource function, very fee in a program lets the Presentation Manager load the resource. All the Presentation Manager med is the resource to see the resource of the resource is the resource to a manager meds is the resource type and the resource name to identify the resource uniquely.

Other types of resources are icons, mouse pointers, hitmaps, fonts, text strings, and dialog box templates. Each of

these has its own resource type ID. You can also define your own resource types. Resources are very handy for large chunks of ASCII or binary data that must be attached to the .EXE file and used by the program.

THE NEW C PROGRAM The listing for BOXES2.C is shown in Figure 5. It is quite similar to the BOXES1.C listing shown in last issue's Environments column. For the most part, the additional code

involves support for the menu and for painting the client window with different colors.

Only two changes are required in the winCreatestMirdow function. The identifier FS_MENU is included with the other FS (Frame Style) identifiers. This structs the Presentation Manager to create a menu window along with all the other windows. The second to last parameter of WinCreateStdWindow is identified by a comment as the "IDO fresources." This is comment as the "IDO fresources." This is

```
710 MENU. 1
    DOESS2.C -- OS/2 PM program that draws nested bonns in elient window
(c) 1800, Siff Communications Company
PC Repealsm - Cherler Polania, 4/18
                                                                              /* number of bomes to draw */
/* rotate each 1/2@th of mide */
                                                                   STREET, STREET
                                                 arclientcless [] = "Screez" ;
hab ;
haq ;
hvadFrame, bundclient ;
                                                                                                                                                                                                                                                                                                                                                      idForeground - COM
           hab - Minimitialise (8) ;
haq - Minimitialise (8) ;
                                                                                                                                                                                                                                                                                                                                                                                                        NOTHINGSHOOT (Liferenced, TRUE),
NOTHINGSHOOT (NIA CHECKED, MIA CHECKED))
                                                            hab,
atclientclass,
clientwidtcoc,
cr sixtatosas
                                                                                                                                 /* Anchor black handle
/* Hame of cleam being region
/* Window procedure for cleam
/* Class style
/* Extra bytes to reserve
                                                                                                                                                                                                                                                                                                                                                    breek :
                                                                                                                                                                                                                                                                                                                                  misinvalidateRect (howd, MCLL, FALSE) ; break ;
                                                                                                                                                                                                                                                                                                                                           e = Minsegiarmint (band, MULL, WILL) ;
                                                                                                                                 /* Client window clear name */
* Title bar tent */
* Style of client window */
/* Nodule handle for resource */
/* ID of resource */
* Tointr to client window handle */
                                                                                                                                                                                                                                                                                                                                    ept1[0].a = apt1[1].a = 0 ;
                                                                                                                                                                                                                                                                                                                                    apti[1]:m = apti[2]:m = mtliset = 1 ;
apti[2]:y = apti[2]:y = 0 ;
apti[1]:y = apti[2]:y = ytiment = 1 ;
                                                                                                                                                                                                                                                                                                                                    OpidatColor (hps. slColors(idSackground = IDM_BACKGROUND)) :
                                                                                                                                                                                                                                                                                                                                    Opinowe (hps. aptl) ;
Opinox (hps. pmc PlLL, aptl + 2, SL, SL) ;
                                                                                                                                                                                                                                                                                                                                    Go:satColor shoe, alColora(idForeground - Ine_FOREGROUND)) :
           winDestroyMagDuese (hmq) ;
misDesminate (hab) ;
                                                                                                                                                                                                                                                                                                                                    for (amap = 0 ; amap < presented ; amap ++)
                                                                                                                                                                                                                                                                                                                                                    SOURT REPERTET ClientFooTron (SMED bond, WESTON mag, MPANAM mpl, MPANAM mpl)
                                                                                                                                                                                                                                                                                                                                                    dp:Hove (hpe, aptl) ;
Gp:PolyLine (hpe, 4L, aptl + 1) ;
                                                                                                         BLACE, CLE BLUE, CLE MED, CLE TIME,
SMEER, CLE CTMM, CLE TELLOW, CLE WESTE,
JAMESTON, CLE SAMENGES, CLE CANDISCE,
SAMESTON, CLE LAMENGES, CLE CANDICTME,
MANNE, CLE LAMENGES, CLE CANDICTME,
                                                                                                                                                                                                                                                                                                                                                    for (emide - P / emide - 4 / emide--)
                                                                                                                                                                                                                                                                                                                                                                      aptl(aside).s = ((INCREMENT - 1) * aptl(aside).s + aptl(aside + 1).s * INCREMENT / 2) / INCREMENT /
                                                                                                                                                                                                                                                                                                                                                                      eptlication;y = ((Dec
                                                                                                                                                                                                                                                                                                                                                                                                                                         eptication + 1) + aptication y + eptication + 1) y + 1
                                                                                                                                                                                                                                                                                                                                                    rn WindefWindowFroc (hwed, meg. mpl, mpl) s
                                                                              HindowFromiD (
BisQueryWindow (bood, QW PARENT, FALSE),
```

Figure 5: The source code for the program BOXES2.C.



The computer world is humming about two new Samsung Semiconductor & Telecommunications (SST) brilliant performers - the S500 and S300. Fully AT compatible, the S500 is the right PC to turn your one-man show into a sym-

phony. Easily switchable from 8 to 10 MHz, the S500 offers 8 expansion slots to support video displays, moderns, expanded memory and more. A 1.2 MB 5 1/4" floopy disk drive comes standard and a hard disk can be added for ample memory capacity.

It possesses superb talents such a small package, only 16" by 16" Fully XT compatible, the S300 runs at 4.77 or 8 MHz and is a powerful, yet economical alternative. It is ideal for use as a stand-alone system or for inclusion as a workstation

Samsung Semiconductor & Telecommunications (SST) supports its already excellent reputation in the computer industry by offering you these excellent products and an attractive warranty program to support them.

New from Samsung. S500 and S300 that're yours for a song.

These products are soley distributed through Tech Data Corporation, wholesale distributor in U.S.A and through CANARA in eastern CANADA, TERRIER in western CANADA.



in a local area network.

Semiconductor & Telecommunications CIRCLE 298 ON READER SERVICE CARD

series readinguistics of the Front Assistance Beding IP has Utel-no. Chang-has Seoul, Korea C PO Box 803 more of 11 800, 777.78 erd 581 - 5 feles lifeccom KS277 Fectowids (591-802) 156-2550 Column Other 200 Caucher Mil Lamis Series Clara C ASSIST Fectowids (591-802) 156-2550 Column Other 200 Caucher Mil Lamis Series Clara C ASSIST Fectowids (591-802) 156-3550 Janes Other Column Column Other Series Clara C ASSIST Fectowids (591-802) (591-802) (591-802) Janes C Assistance C Assi

AND ALL THE PROPERTY OF THE PR A and PC XTMT are registered trademarks of international Guainess Machines Corporation.







INTRODUCING THE MOST POWERFUL, "ALL IN ONE" LOOP 286 COMPUTER





LOOP 88

- ★ Intel 8088 Base System.
 ★ 4.77 10 MHz Clock Speed.
- 640K Memory on Board
 Hard & Software Switcha
 8 Slots

- * 8 Slots

 ERSO BIOS

 150W Power Supply

 One Teac 360K Flappy Orive

 Floppy Orive Controller.

 AT Type Keyboard (84 Keys)

ALL SYSTEMS WITH:

- One Year Limited Warran
- 72 Hours Burn in Work.
 Fully Assembled & Tested Assurance in U.S.A.
- 30 days money back guarantee
 FREE UPS ground in U.S.A.
 Major credit cards acceptable

LOOP 286

- Western Oigital 286 Main Board
 Western Oigital BIOS

 1 MB Memory on Board
- ◆ 1 Wait State
 ◆ 0 Wait State Available
- One 1 2 MB Floppy Drive

BASE SYSTEM \$539

it-in 1 MB of ORAM at 2568

WESTERN DIGITAL 286 MAIN BOARD

Enhanced Capacity Keyboard (101 Keys)
 Case Ormension 17" * 16" * 6"
 Best Quality Guarantee

BASE SYSTEM \$1335

CALL SPECIAL PRICE FOR HARD DISK, MONITOR, TAPE BACK-UP, CO-PROCESSOR & MODEM QUALIFIED CORPORATION & UNIVERSITY P.O. ACCEPTABLE. DEALER INQUIRY WELCOME

ORDER HOT LINE: 1-800-521-4892 IN CALIFORNIA: 1-714-937-1670

VERTEX GIRCLE 184 ON RELABER SERVICE CARD

Advanced Research, Inc. 1820 Orangewood Ave. Site 203, Orange, CA 92888

ENVIRONMENTS

ID. MAINMENU, which is the resource name ID used in BOXES2.RC to identify the menu

With only these two changes, the Presentation Manager can read the resource from the BOXES2.EXE file, create the menu window, and position it below the title bar window.

THE WM_COMMAND MESSAGE

The ClientWndProc function in BOX-ES2.C is the window procedure for BOX-ES2's client window. This window procedure processes all messages to the client window. Many of these messages, including keystrokes and mouse activity, are passed to the WinDefWindowProc function for default processing. A window procedure needs to examine only messages that it is interested in handling.

We saw in the last issue how BOXES1 processed the WM_SIZE message (to determine the size of the window whenever it changed) and the WM_PAINT message (to keep the surface of the client window

up to date). BOXES2 continues to process WM_SIZE and WM_PAINT, but it also processes another message: WM_COM-MAND. When the user chooses an item from a menu, its window procedure sends a WM_COMMAND message to the client window procedure. This is how the client window procedure knows the user has chosen an option from the menu.

Every message is accompanied by two message parameters, mp1 and mp2, which contain information specific to the message. In the case of the WM_COMMAND message, the ID of the selected menu item is encoded in the lower half of mp1. This ID can be extracted using this generalized

SHORT1FROMMP (mp1)

Or, for WM_COMMAND messages, the ID is available using the COM-MANDMSG macro

COMMANDMSG(&msq)->cmd

The COMMANDMSG macro is somewhat complex because it uses a pointer to access the stack, but it's clearer if you think of the menu ID as being a command ("cmd") to the program.

The client window procedure must do a





SCALL \$799

SCALL

\$365 MI -300

LASER PRINTERS

MB 2 MB MEM BO

THESYS MULTIFUNCTION CARD

CLK/SER/PAR PORTS ATT VIP VGA GRAPHICS . .

FOR PC/XT LIM MEMORY SOARD

EXPANDABLE UP TO 1M8 INCLUDES

\$59/\$9



SU	SUMMA	SKETCH	PLUS 1ZX1	2. 54
	MOVIE (2	LEAD .		. 14
	RO OIS			
SE	AGATE :	SPECIA	1	
40	20	6220	(up to	45540
73	5 HARD	9000	(ah to	4000
522	25 (2584)	D WILLIAM		52
	38 30M			\$3
\$54	096 (86M	45) W/O	CTR	\$8
\$14	144 (1204	B) W/O	CTR	\$9
M	8 3.5" H	100 9151	7/190	52
211	39 (30MS	W/U CI	H	\$3
211	57 (40448	WIND C		64
M	ELECTION	8886 (7)	MEN	
-	6128 (11	(BMO)		\$573.8
м	ROPOUS	1335 (7)	(BMC)	\$6
	1355 (14	OWE! AL	ESDI CTR	\$15
	E 310MB			SCA
	5 23/40		SCSI CRE	re sca
PLI	2 7 3 4 4 3 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5	NO PARK	SPECIAL	24
M	NSTREA	M SOME	TADE	\$5.8
48	NINE SEE	AR INT/F	11	- 85
	ON TAPE			



UPER MAC VIDEO CARO PECTRUM CARD 256 COLD

INTEL ROUT-2	\$149
8087-1 80287-8/10	\$219
80387-16 80387-20	\$479
256K1 MB RAM	SCALL
BROTHER FAX	
EAY 100	0000

CIRCLE 266 ON READER SERVICE CARD

slots, 1 Per/Ser port, CMDS chnology, IM8 static rea RAM, runs Novell, CAB/CAM, Xenix/Unix, 1 year warranty BENTECH 386-20 80386/20 cpu, otherwise same es ebove 10MH2 \$549 8088, 512K RAM, 360K8 dr. four bay case, 1 Ser/Par/Clk/Geme. **GENTECH 286/10** 6/10MH2 R02R6 512K RAM, 1,2MB dc, 101 Keybd 1 Ser/Clk/Parallel port, 2 bays

GENTECH 386-18

B0386/16 ccu. IMB RAM. 1.2MB Dr. 3 bays award bios, one

32-bit, five 16-bit, two 8-bit

GENTECH PORTABLE 286 \$1229 9" Amber screen, Hercules ohics, 7 slots, 512K RAM. 2MB dr, 3 bays 401-732-5556

For Menochrome System \$139 For Color EGA System

pertwist LCO Screen, 512K

RAM, 6 slots, 80287 slot, 1.2M8 dr. 2 bays

\$1599

For Color VGA System.

BENTECH LCO-286

800-843-4302

217 Brandway, Suite 618, NY, NY 10003 WSA, MC, COO, CORPORATE PO Accepted Acid 2% for COS Minimum PO SSCO Prices subject to change Return extherization received for defective merchandists. All to 20% restocking charge

PC MAGAZINE

It copies 51/4 and 31/2 inch diskettes all by itself.

Just load your diskettes, press one button, and walk away. The Victory Duplicator automatically comes diskettes operating sta or attached to an IBM/PC, Macintosh, or Mountain compatible system. Bulk cannisters allow fast. easy loading and unloading.

Switching drives takes less

than three minutes.

Copy Different Formats, Flawlessly. Our Auto-Formet-Analysis feature lets you copy dif-

ferent formats, including PS/2. The system tests for quality and accuracy, sorting disks into one of two output

No User-Required Adjustments. The Dimicator's selfcalibration and simple diagnostics for checking drive alignment allow you to maintain

the system without outside Call 1-800-421-0103. And ask about the Victory family of affordable duplication systems - with seruization, copy protection

and custom label printing.

8910 Research Blvd., B2 512-450-0800 In Europe call SFI Farm CD-1: GLDREC Propolation in NaCO 27951 London NA 1 NC ARM, Mign CR-2: CR78, Nandrob

ISM PC PS-2 Macetook, and Mouras are traderuples or registered traderuple

CIRCLE 113 ON READER SERVICE CARD

The 3½" Way To Make Portables Talk to PCs.



Now you can mount a Toshiba 31/2" floory drive into the space where a 51/1 drive would go. Our universal installation kit (included) makes it easy to install in your tBM* PC, XT;" AT or compatible. A software driver is available if needed. And, presto! Media. compatibility between portables and their deskbound brethren. In stock! Call Dottie Wilder for the name of your nearest dealer.

714-954-1125 Drive your combuter habby.

In Touch with Tomorrow

ENVIRONMENTS

little work when it receives the WM_COMMAND message. The window procedure must save the ID to use later when redrawing the window. It must also remove the check mark on the previously selected color and add a check mark to the new selected color

But the menu window, not the client window, is responsible for drawing the menu, including drawing check marks next to items. Thus, the menu window must be told to remove or add a check mark. How can the client window tell the menu window to do this? By sending it a message, of course. In this case, the message is MM_SETITEMATTR, which can be translated as "Menu Message-Set the Attribute of a Menu Item."

A program can send a message to a window by calling the WinSendMsg function. The four parameters to the function are the same as those of the window function-the window handle, the message, and the two message parameters.

The processing of the WM_COM-MAND message begins with calls to the WinQueryWindow and WinWindow-FromID functions. The WinOuervWindow function with a OW_PARENT parameter obtains the window handle of the client window's "parent," which is the frame window. The WinWindowFromID then obtains the window handle of one of the frame window's children, specifically the menu window. This is stored in the variable hwndMenu

BOXES2.C maintains the currently selected background and foreground IDs in the two variables idBackground and id-Foreground. These are initialized (respectively) to the values IDM_BACK-GROUND +7 and IDM_FORE-GROUND, which are the IDs of the two items initially checked in BOXES2.RC.

During WM_COMMAND processing. BOXES2.C determines whether the menu item ID is for one of the background colors or foreground colors and does similar processing for the two cases. The first call to WinSendMsg sends an MM_SETITE-MATTR message to the menu instructing it to remove the check mark from the currently checked item. The two 32-bit message parameters that accompany the MM_SETITEMATTR message are each actually two 16-bit values stuck together

A Message to People Who Are About to Buy A 19" Display System Elsewhere.



Don't do it.

Not before you see our new DesignView/19 Display System, because, when there's no substitute for quality, you can't make a better choice.

This excellent display system is quickly capturing the hearts and minds of art directors, designers and desktop publishers everywhere. And there's good reason.

First, we have an excellent selection of high resolution drivers*, and a flawless CGA emulation that allows you to run 1000's of software programs in full screen.

Second, we offer an unusual sixty-days unconditional money back guarantee that allows you to use this Display System at no risk.

Third, there is the price....only \$1695, complete with monitor, 32 bit Intel-based video controller card, and drivers.

Plus a 1-year warranty on parts and labor.

So there it is: excellent drivers, a no-risk money back guarantee and a price hundreds of dollars less than our nearest competitor.

Call (215) 639-9567 and order your DesignView/19 Display System today!

You might say it's in your best interest to do so.

Elite Business Applications, Inc. - 4201 Remo Crescent - Bensalem, PA 19020 - (215) 639-9567

*(1280x1024) resolution, two full 8-1/2" x11" pages side by side, drivers for Ventura Publisher, PageMaker, GEM, AutoCAD, Publisher's Paintbrush, Lotus 1-2-3, Symphomy, Windows, Excel, and others. The DesignView/19 Display works with any PC/XT/AT for any 100% compatible) and runs 100% of programs in full screen.

Todermots/Domen: Design/Wew/19/Ellis Bashess Applications. Inc.: BM/International Business Machines. Corp.: Microsoft. Windows and EntelfMicrosoft Corp.: Population/Education. Corp.: Education Entered. Entered Entered En

Database Add-In for 1-2-3 Has More Capabilities Than Rivals

by Marvin Bryan

The king of the crowded forest of Lotus 1-2-3 database add-ins is unquestionably @ BASE...

@ BASE was developed by onics Corp of Concord, Mass makers of the popular SeeMORE utilities that add additional columns to

the screen displays of Lotus 1-2-3 and With @BASE, it's possible to build colonial 32 M-byte databases in the standard dBASE III Plus format out ever using dBASE itself. I were can consert a normal 1-2-3 database nthrinto a dBASE compatible

file, as well as set up dynamic links that will import updated information from dBASE records every time a worksheet is recalculated. A database can be sorted alphabetically, numerically or chrone on as many as 128 levels

In fact, @ BASE will pack and sort ds as meach as three times faster an dBASE Data can be analyzed with a se tubulation module to provide lightning-fast reports in response to

ch questions as: "What sales people each division earned more than \$20,000 in commissions this month to addition, month can be red or examined in a form view,

vidual screen Alternatively, of course, the user can choose the usual con-record-to-a-line format We tested the current \$195 minor

of @ BASE along with a beta copy of the Option Pac, which will retail for 89.95 Together, these two relatively inexpensive proc provide truly remarkable

ctionality. In addition to the indexing feature, the Option Pac will join files to make relational databases, create computed or derived fields, sort a database without marriconne the records on disk, and automatical keep files in the cornet section order during record entry or updating.

As a borrus, dBASE data can be practically no effort at all Personics has developed a series of @ EB functions to perform calcu-

lations and evaluate records within GI RACE Each of these functions use one or more arguments to identify the database, record or field to be acted upon Some functions allow criteria to be established, such as selecting a cubert of records

The 200-page manual for @ BASE is excellent...The program add less than SM bytes to the RAM overhead of 1:2-3. For those who use both dBASE and Lotus 1-2-3. @ BASE is practically

See our ad on page 63 @BASE

A database add-in for Lotus 1-2-3 that will access and create dBASE files without the use of dBASE itself

Price: \$195 Personics Corp. 2352 Main St., Building 2 Concord, MA 01742

(617) 897, 1575 (800) 445-3311 X1104



Back up your software with CopyWrite

CopyWrite backs up hundreds of copy protected software packages for the IBM PC. Where feasible, CopyWrite removes copy protection entirely.

CopyWrite now includes ZeroDisk, allowing you to run some popular software from a hard disk without anything in your floppy drive. Call for the list of software it handles.

CopyWrite is revised regularly to keep up with the latest in copy protection. Revisions are available for a small charge.

CopyWrite requires an IBM PC, XT, AT, PS/2 or compatible with 256k bytes of memory and at least one diskette drive. It is not copy protected. CopyWrite is not for making copies for sale or trade, or for any other use that deprives software authors of payment for their work.

To order, send us a check for \$50 US funds, or call with your credit card. We ship within a day. Available on 3 and 5 inch diskettes.

> Quaid Software Limited 45 Charles Street East Third Floor Dept 207 Toronto Ontario Canada M4Y 1S2 (416) 961-8243

ENVIRONMENTS

(so to speak) by using the MPFROM-2SHORT macro. The second message parameter tells the menu to change the MIA _CHECKED attribute bit for the item by setting it to 0.

BOXES2 saves the selected menu item 1D in the idBackground or idForeground variable and sends another MM_SET-ITEMATTR message to the menu window. This message tells the menu window

to add a check mark to the indicated item. The second message parameter tells the menu to change the MIA_CHECKED attribute bit by setting it to MIA-_CHECKED (that is, to set the bit to 1).

This is fairly standard code for handling menu check marks. Obviously it is somewhat complex at first encounter, but it's certainly easier than the alternative, which is writing your own menu logic.

INVALIDATING THE WINDOW After processing the WM_COMMAND message, BOXES2 must repaint the client window using the new colors. But the program postpones this and, instead, calls

WinInvalidateRect (hwnd, NULL, FALSE) :

This function "invalidates" the entire client window. BOXES2 is telling the Presentation Manager that the surface of the client window needs to be repainted. The Presentation Manager then sends the client window a WM_PAINT message. The program repaints during that message.

This is one of the peculiar ways in which Presentation Manager programs are structured. A window procedure can get a WM_PAINT message at almost any time. It must always be prepared to repaint the entire window. Thus, it makes sense to paint the window only during the WM_PAINT message. Calling WinlnvalidateRect generates a WM_PAINT message so the client window can repaint.

PROCESSING THE PAINT MESSAGE Most of the code in the WM_PAINT section of ClientWndProc is similar to that section in BOXES1. The additional code involves using the colors.

A Presentation Manager program can specify a color for subsequent drawing functions by calling the function

```
# BOXES2 make file
boxes2.obj : boxes2.c boxes2.h
    cl -c -G2sw -W3 -Zp boxes2.c
boxes2.res : boxes2.rc boxes2.h
    rc -r boxes2
boxes2.exe : boxes2.obi boxes2.def boxes2.res
```

link boxes2, /aliqn:16, NUL, os2, boxes2

Figure 6: The make file used to generate the BOXES2 application.

```
BOXES2.DEF module definition file
              BOXESS
DESCRIPTION
               'Draws boxes in client window (c) 1988, Siff Communications Co.'
              1824
              ClientMndProc
```

Flaure 7: The BOXES2.DEF module definition file.

rc boxes2.res

where hps is the handle to the presentation space obtained from the WinBeginPaint function, and lColor is a color index. (The l prefix on the variable name means the variable is a 32-bit long integer.)

The Presentation Manager header files have a collection of color index identifiers beginning with CLR (CLR_WHITE. CLR_BLACK, CLR_RED, and so forth). In BOXES2, the alColors array is initialized with these identifiers in the same order that the colors appear in the menu. (The "al" prefix indicates that alColors is an array of long integers.) Thus, BOXES2 can obtain the proper color index from al-Colors by indexing the array with the value (idBackground - IDM_BACK-GROUND) or (idForeground IDM_FOREGROUND).

The GpiBox function with a DRO FILL parameter draws a filled rectangle. This is used to color the background of the window before drawing the lines. The line-drawing logic is the same as in BOX-FSI C

AUTOMATING THE COMPILATION Now that we've started using a resource script, creating the BOXES2.EXE file is somewhat more involved. But it's nothing that MAKE can't handle. The make file for BOXES2 is shown in Figure 6. If you have the Presentation Manager update to the OS/2 Software Development Kit installed, you can create BOXES2.EXE from all its components by running

MAKE BOXES2

Note that a change in the BOXES2.H file causes MAKE to recompile both the resource script and the C program because both files make use of the same header file. The BOXES2 DEF module definition file shown in Figure 7 is the same as BOXES-1.DEF except for the program's name.

COMING UP: DIALOG BOXES Near the top of BOXES2.C are two identifiers named NUMBOXES and INCREMENT. The values of these identifiers determine the number of boxes the program draws and the spacing of successive boxes.

Wouldn't it be nice to change these values while the program is running and see how the new design looks? Because you may want to change them to a wide range

of numbers, a menu isn't adequate. It looks to me as if BOXES3, coming in my next column, will have to contain a dialog box.

ANYTHING on your hard disk

In contents of all files - word processor, databases, source programs, accounting, random notes.

Instant Search. Att+8 Hot key from any program. Type word, word root, word proximity, number, or phrase, with wild cards

F2 List of all files containing search term appears in seconds. ← Select file. Term appears highlighted

in its surrounding text or data. + + + → Navigate F8 next hit or F10 next file.

Alt+p Cut-and-paste into your word processing document. Search without indexing OR index once to make searches 50 times faster (while

your best customer is still on the phone). Automatic indexing. Fo World's fastest indexing and smallest index (15%). Up to 7,500 files, 30 megabytes, Folders, to organize your data. Memory Lane, the essential companion

to your DBMS or word processor for random information management and full-text retrieval.

Group L Corp., 481 Carlisle Dr., Herndon, VA 22070 (703)471-0030 Send copies of Memory Lane
at \$149 each. VA residents add 4.5%
☐ VISA ☐ American Express
Exp. Date
Card No.
Signature
Name
Company
Street
City
StateZip
Telephone

Call 800 672-5300

HARD DRIVES

Seagate

Includes drive, AT mounting hardware & "Disk Manager" partitioning software

Also available for XT

40Mb ST251 \$369 PC/XT KIT

Includes drive, controller, cables, How-To manual, mounting hardware & partitioning software

> Drives and Kits are available for PS/2 models 25 & 30!

Card Drive Hard Cards

Card Drive 20S 30ms \$319 Card Drive 30S 30ms \$349 Card Drive 50S 30ms \$499

- -- Features --· Available for most Tandy models
- · Quality engineered for reliability
- · Super easy installation & setup
- ONE YEAR Warranty
- · Auto park heads

These Card Drives use quality Seaguse Hard Drives

30 Day "Worry-Free" Guarantee

If for any reason, you are not completely satisfied with any product, simply return it for a prompt and ous refund!

20_{Mb ST225 KIT}

Complete PC/XT KIT includes drive, controller, cables, How-To manual & mounting hardware.

Seagate 150Mb K

We carry the entire Seagate product line including 3.5" drives

Seagate ST4096 Full Height + 28ms a

Complete PC/XT KIT

Complete PC/XT KIT includes drive, controller, cables, How-To manual & mounting hardware.

Includes drive. AT mounting hardwar &"Disk Manager" partitioning



call away with our Technical Assistance Department!

65мь sт277r 60ms access . Half Height Autoparking heads

drive requires an RLL contro

Includes drive, mounting hardware &

High Speed 40Mb

Seagate ST251-1 ss • Half height • Auto parking heads Also available for XT

Includes drive. AT mounting hardware & "Disk Manager" partitioning software

No Surcharge for Visa or MasterCard Orders

Hours: 8am to 7pm Monday - Friday, 12pm to 5pm Sat. MST



Customer Service: (800) 541-8387 s and availability subject to change without notice. All imms are NEW with a surchange. Add \$10 shapping for APO/FPO orders. 30 Day Guar (800) 234-DISK

1208 E, Broadway Road #110 . Tempe, AZ 85282 (602) 784-1038 FAX; (602) 829-9193

FULLY QUALIFIED FILENAMES IN C



The C program presented here is the equivalent of last issue's MASM routine. Comparing them shows that sometimes you must pay a high price in size for using a high-level language.

programs that let the user change disrectories and/or drives must be carrful to store filenames in their complete form rather than in the abbreviated fashion MS-DOS accepts su user input. I discussed this subject in detail in my previous column. I also presented there a MASM routine (QPN.ASM) to build fully qualified filenames—that is, to cornert a filename with a partial path and/or missing drive, such as

..\subdir\myfile.dat

into a filename that includes a drive and full path from the root directory, such as c:\mydir\subdir\myfile.dat

QFN.C, which is shown in Figure 1, is the C equivalent of QFN.ASM. It is called with a pointer to an ASCIIZ filename:

char *p,*q;
q="myfile.dat";
p=qfn(q);

and it returns a pointer to a fully qualified ASCIIZ filename. A null pointer is returned if the specified drive and/or directory do not exist.

Like QFN.ASM, QFN.C does not make any attempt to determine whether a particular file actually exists—only whether the specified or implicit location for the file is feasible. Thus, the routine can be used to generate fully qualified names of files that have not vet been created.

You can also use QFN to evaluate drive/path combinations without any filename. If you supply QFN with only a drive identifier, it will return the drive and the

```
OFN.C Qualify Filaname
    (C) 1988 Ziff Davis Communications
    Ray Duncan, April 1988
finclude <stdio.h>
#include <string.h>
#include <dom.h>
union REGS rags;
etatic void eetdrv(int);
                                    /* function prototypes */
static void satpath(char *);
etatic int getdrv(void);
etatic void getpath(char *);
static char qbuff[88];
                                    /* for qualified filename */
char *gfn/char *p)
   char tbuff[88];
                                    /* target directory */
    char cpath[88];
                                    /* path at entry */
    int cdrive;
                                    /* drive at entry */
    char *q;
                                    /* scratch pointer */
    uneigned i;
                                    /* scratch indax */
                                    /* gat current driva */
    cdrive = getdrv():
    gatpath(&cpath[1]);
                                    /* get current directory */
                                    /* and prepend backslash */
   cpath[#] = '\\';
                                    /* any drive epecified? */
    if((strlen(p) >= 2) 44 (p[1] == ':'))
        i = (p[#] | @x2#) - 'a';
                                    /* yee, convart ASCII driva
                                       to binary drive coda */
        satdrv(i);
                                    /* switch to new drive */
        if(getdrv() (= i)
                                    /* if drive doesn't exist */
           raturn(NULL);
                                    /* return an arror */
```

Figure 1: The source code for QFN.C, a function that converts a partial file specification to a full

qualified path.

■ POWER PROGRAMMING

*/

{

```
getpath(&cpath[1]);
                                    /* get current directory
                                       of new drive */
        p += 2;
                                    /* bump ptr past drive */
    atropy(tbuff, p);
                                    /* copy target pathname
                                       to local buffer */
                                    /* look for last backslash */
    q = atrrchr(tbuff, '\\');
                                    /* any path specified? */
    if (q != NULL)
        *a = #;
                                    /* yas, make path ASCIIZ */
                                    /* select directory */
        if(q == tbuff)
             setpath("\\");
                                    /* target is root */
        alsa satpath(tbuff);
                                    /* targat is not root */
        if(rags.x.cflag)
                                    /* exit if directory */
                                    /* does not exist */
            aetpath(cpath);
                                    /* restore original path */
            aetdrv(cdriva);
                                    /* restore original drive */
            return(NULL):
        q += 1;
                                    /* point to filename */
    else g = tbuff:
                                    /* if no path specified,
                                       point to filename */
                                    /* now drive and/or path
                                        are selected, build
                                        qualified filename */
    qbuff[8] = qatdrv() + 'a';
                                    /* get target drive and
                                       convert to ASCII */
    qbuff(1) - ':';
                                    /* add driva dalimiter */
    qbuff(2) = '\\';
                                    /* and root backslash */
    getpath(&gbuff(31);
                                    /* gat target directory */
                                    /* length of drivs+path */
    i = strlen(gbuff):
    if(i != 3) qbuff[i++] = '\\';
                                    /* if not root add a
                                        trailing backalash */
    atropy(qbuff+i, q);
                                    /* copy in filename */
    aetpath(cpath);
                                    /* reatore original path */
    aetdrv(cdrive);
                                    /* reatore original drive */
    raturn(strlwr(qbuff));
                                    /* fold pathname to lower
                                       case, raturn pointar */
    Set current drive using MS-DOS Int 218 Function SEH
static void setdrv(int drive)
    rega.h.ah = #x#e;
    rega.h.dl = drive;
    int86(@x21, &rega, &rega);
```

current path for that drive. If you provide OFN with a partial or relative path terminated by a backslash, it will return a fully qualified drive and path combination.

To keep OFN,C as generic as possible, I have used only the in t86 function to get and set drives and directories. The code has been tested with both Turbo C. Version 1.5, and Microsoft C, Version 5.0, and should also be easy to port to other MS-DOS C compilers.

HOW QFN.C WORKS The logic of QFN.C almost exactly parallels that of OFN. ASM. Like its MASM cousin, QFN.C relies on MS-DOS to do most of the hard work in pursing paths, directory aliases, and the like.

OFN first saves the current drive and directory with interrupt 21h functions 19h and 47h. The program then picks the drive off the argument string, if any drive is present, and selects it as the current drive with interrupt 21h function 0Eh. To make sure the drive actually exists, OFN checks the current drive to see if it matches the one selected, returning an error if the drives are are different.

Next, OFN copies the argument string to a local buffer and scans for the last backslash character, using the very handy library function strrchr. If no backslash is found, the current directory of the current drive is assumed. If a backslash is encountered, QFN terminates the supplied nath with a null byte and calls interrupt 21h function 3Bh to make it the current directory. (A little extra logic is necessary here to handle the ease of the root directory, where the backslash character is the name of a directory rather than a delimiter.) If function 3Bh fails, we know that the path is invalid, and an error is returned to the caller.

At this point, the drive and/or directory specified by the user have been selected. The fully qualified filename is built up by calling interrupt 21h functions 19h and 47h to get the current drive and directory, formatting them together in a buffer, and then appending the original filename. The drive ende, nath, and filename are folded to lowerease characters for visual consistency. Finally, the original drive and path are restored, and a pointer to the fully qualified filename is returned to the calling pro-

(Figure 1 continues)



Which would you like to see first? The world's fastest dBASE compiler or the most powerful database development language?

Surprise. Now you get both in the same package. New Clipper" from Nantucket."

Our latest version - Summer '87 - is still the bestperforming compiler ever. It lets users run dBASE applications up to 20 times faster. But there's a lot more to it than raw speed.

Because new Clipper is one of the most powerful, full-featured development languages ever. And gives you more control over your applications than any release of dBASE ever will. Now or in the future.

Instead of designing Clipper as an add-on, we've structured it as an extended database language that uses dBASE as a subset. In addition to emulating the dBASE language, we've added commands for menus, screens, windows and extended functions. As a result, you get dBASE compatibility and an entirely new level of power and versatility,

And with Clipper's open architecture, you can write functions in Clipper, C, Assembler or other languages, and integrate them into one seamless application. Which helps you create more sophisti-

C Nantucket Corporation, 1988. Nantucket is a registered trademark and Clipper is a trademark of Nantucket Composition. 4BASE is a registered trademark of Ashton Tito

cated applications in less time. And by using our full-featured debugger, you'll be done even faster. We also give you source code security that

keeps users from damaging your application. And sophisticated record and file locking capabilities that make networking applications easier to create. But no matter what you create, you don't have to buy runtime modules or additional software. You don't even have to pay licensing fees.

If you haven't tried Clipper yet, just call (213) 390-7923 today. We'll send you full information and a free demo diskette. Or the complete program, if you'd rather.

But call today. And see how easy it is to find the best dBASE development

language. Just get the fastest compiler. And open the box.

■ POWER PROGRAMMING

```
Set current path using MS-DOS Int 218 Function 3BB
•/
static void setpath(char *p)
   regs.h.ah = 9x3b;
    regs.x.dx = (unsigned) p;
   int86(0x21, &regs, &regs);
/*
   Get current drive using MS-DOS Int 21H Function 19H
./
static int getdrv(void)
    regs.h.ah = 0 \times 19:
    int86(8x21, &regs, &regs);
    return(regs.h.al);
/*
    Get current path using MS-DOS Int 218 Function 478
static void getpath(char *p)
    regs.h.ah = 8x47;
   regs.h.dl = 0:
   reqs.x.si = (unsigned) p;
   int86(8x21, &regs, &regs);
```

(Figure 1 ends)

```
TRYOFH . C
                    Demonstration of use of QFW.C
                    module tn quelify filenam
        Ray Duncen, April 1988
finclude <stdin.h>
extern cher *gfn(cher *);
main(int ergo, cher *ergv())
   cher buffer[80];
                                     /* buffer for user input */
   cher *p;
                                     /* receives ptr from qfn */
   while(1)
                                     /* do until empty line */
                                     /* prompt user for filename */
        printf("\nEnter filename:
                                     /* reed in filename */
        gets/buffer):
        if(buffer(8) == 8) breek:
                                     /* exit if no entry */
        p = ofn(buffer);
                                     /* else quelify filename */
        if(p |= NULL)
                                     /* displey filename or
                                       arror message */
            printf("\nThs full pethname is: %s\n".p);
        else printf("\nBad filename:\n");
```

THE QFN ROUTINE IN ACTION
The program TRYQFN.C shown in Figure 2 demonstrates the use of the QFN routine. It prompts the user for a flename, qualifies it with the drive and full path, and displays the result. The demo program may be terminated at any time by pressing the Enter

 Quick size comparisons after assembling or compiling both modules show the C programs are six to seven times as large as

the MASM version.

tering Ctrl-C ('C). A sample session with TRYQFN is shown in Figure 3. If you are using Microsoft C 5.0, enter the following command to compile and

If you are using Microsoft C.S.O, enter the following command to compile and link TRYQFN.C and QFN.C into the executable program TRYQFN.EXE:

CL TRYQFN.C QFN.C

If you are using Turbo C, create a project file TRYQFN.PRJ containing the lines

TRYOFN.C QFN.C

and then "make" the project file by loading it and pressing the F9 key.

THE LANGUAGE WARS Having equivalent MASM and C versions of TRYQFN and QFN in hand, I decided to do some quick size comparisons. I assembled or compiled and linked both modules without symbolic debugging information. In the case of the C compilers, I selected optimization for size and used the small-memory model. The comparative results are shown in Figure 4.

Aside from the differences between the

code generated by the two C compilers, there is another, much more dramatic difference between the C programs and the



Never before has this level of Reliability and Durability been available in floppy disks. Introducing the new RD Series from Maxell Twice the durability of the disks you're now usuag. Twice the resistance to dust and dirt. And the RD Series is ten times more reliable than conventional floppy disks.

nan conventional Hoppy cisks. The Gold Standard has always me of maximus afety for your data. Now it means even more.



POWER PROGRAMMING

MASM program. Even though I made no attempt at all to optimize the MASM code for size—and allowed the C compilers to do their best for worst) at size optimization—the C versions of the executable program are six to seven times as large as the MASM weight?

Why do I bring all this up? Because there are people who would like you to believe that there is no longer any reason to use assembly language. The new Microsoft OSI2 Programmer's Reference Munual, for example, documents all the system

ealls as C function prototypes, effectively disenfranchising all the MASM (and FOR-TRAN, BASIC, and Pascal) programmers

who'd like to write OS72 applications. Figure 4 provides a simple lesson, but not a misteading one. Although CPU power, RAM, and disk space are cheap today, they are not yet free. Imagine the consequences if every program on your disk were six or sevent times as big as it needed to be to get its job done! When size and speed are important. C compilers still have a long way to go before they can climinate

foo.dat <Enter>

c:\word\foo.dat

c:..\ <Enter>

c:\word\

c:\word\pc\foo.dat

c:..\foo.dat <Enter>

the need for assembly language.

Speaking of the future of & completes, precedy participated in a puncle on the point at the West Coast Computer Faire. Two fits other members of the other members of the path ewer David International and Creg Labellation of Memosti Corp., both and Creg Labellation of Memosti Corp., both panies: C translation. Aside from the formula sales pitch and goals for the future that both presented (improved editors, designed, computer-assisted software determined, computer-assisted software determined, computer-assisted software determined.

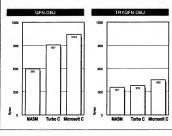
Both men warned against taking the benchmarks commonly used by reviewers to compare C compilers too seriously. I heartly endorse this position, since the popular benchmarks have little predictive value for the fellow who is writing a "typical" MS-DOS application. The best test of all, when deciding which compiler to buy, is to compile your own production code on each and observe the results.

For my own part, I'd also advise you to

C>TRYQFN <Enter>
Enter filename:
The full pathname is:
Enter filename:
The full pathname is:
Enter filename:
The full pathname is:
Enter filename: <Enter>
C>

Figure 3: A sample session showing operation of the TRYQFN demo program.

Comparing File Sizes: Assembler vs. C Compiler



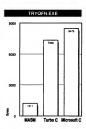


Figure 4: QFN and TRYQFN object and executable file sizes (in bytes) for MASM 5.0, Turbo C 1.0, and Microsoft C 5.0. C compiles were performed with optimization for size, using the small-memory model.



PC MAGAZINE FOR LESS THAN \$1.19 A COPY!

Take advantage of this special offer and subscribe to PC Magazine and SAVE 60% with these low prices—You'll SAVE over \$1.76 a copy!

PC Magazine is the best magazine covering desktop computing. Every issue delivers the information you need. Unblased product reviews and comparisons..in-depth coverage on new applications that can save you money... And you'll save over \$77 on a two-year, 44 issue subscription to PC MAGAZINE!

Subscribe today to the IBM/MS DOS magazine that delivers handson tested PC-PS/2 product comparisons and evaluations conducted by PC Labs, the publishing industry's independent IBM-compatible product testing laboratory and save! Two years (44 issues) for \$51.97. SAVE 60%! Less than \$1.19 a copy! One year (22 issues) for \$31.97. SAVE 51%!

Only \$1.45 a copy.

Savings based on newsstand price of \$2.95 per issue.

Basic annual subscription is \$44.97.



FOR FAST SERVICE CALL 1-800-525-0643

Mainframe Power for your PC!

If you need or are accustomed to the throughput of a 32-bit min, including any of DEC's VAX series, MicroWay has great news to you. The combination of our NDP complets and our mW1 167 numeric coprocessor gives your 386 PC, VAX speed If you don't own a 38 PC, we provide a number of economical manufacture.

PC and AT upgrade paths.

Many of our NDP Fortran-986 users are reporting turn around times that are two to air monething turn around simes that are two to air man are function of the NAX processor being used, the speed of the 988, the number of users being used to the speed of the 988, the number of users being used to the speed of the 988, the number of users being used to the speed of the 988, the number of users being used to the speed of the 988, the number of users to the speed of the spe

Dr. Robert Atwell, a leading defense scientist calculates that NDP Fortran-386 is currently saving him \$12,000 per month in rentals of VAX hardware and software while doubling his productivity!

Fred Ziegler of AspenTech in Cambridge, Mass. reports 11 ported 900,000 lines of Fortran source in two weeks without a single problem!" AspenTech's Chemical Modeling System is in usa on maintranes working and is probably the largest application to ever run on an intel processor.

Dr. Jerry Ginsberg of Georgia Tech reports "My problems run a factor of six faster using NDP Fortran-386 on an mW1167 equipped 386/20 than they do on my MicroVAX II." troduces the first of many utilities that will ease the porting of your favorite in-house programs. These include tools like NDP-Plot, which provides CalComp compatible screen and printer graphics, and NDP Windows.

MicroWay has mW1167 boards in stock that no no the Compaq 368/20, 18M PS2/80, Tandy 4000, 473 T 6396, Acer 386/20, Evers Step 386/16(20), H.P. Vectra RS1/6(20) and others. We now have a new board for the Compaq 386/20 which combines an 1167 with VGA support that is register compable with IBM—the "SlotISaver". It features an extended 800x600 high res mode that is ideal for 368

workstations.
Finally, we still offer the 16-bit software and hardware which made us famous. If you own e PC or AT and are looking for the best 8087/80287 support on the market, call (508) 745-7341 and we'll send you our full cataloo.

32-Bit Compilers and Tools

NDP Fortran-385™ and NDP C-386™ Compilers generate globally optimized mainframe quality code and run in 386 protected mode by the control of the control of the control of the KENIX. The memory model employed uses 2 segments, each of which can be up to 4 sograms, and of which can be up to 4 sograms, or mWH 167. Soft compilers include high speed EGA graphics extensions written in C that perform BASIC-like screen

 NDP Fortran-386™ Full Implementation of FORTRAN-77 with Berkeley 4.2, VAX/VMS

and Fortran-66 extensions.

NDP C-386™ Full implementation of AT&T's PCC with Microsoft and ANSI extensions.

NDP Package Pricing: 387FastPAK-16: NDP Compiler, PharLap, and 80387-16 Coprocessor \$1299 1167FsstPAK-16: NDP Compiler, PharLap, and mW1167-16 Coprocessor \$1695

NDP Windows™—NDP Windows includes 80 functions that let you create, store, and recall menus and windows. It works with NDP C-386 and drives all the popular graphics adapters. Library \$125, C Source \$250

NDP Plot™ — Calcomp compatible plot package that is callable from NDP Fortran. It includes drivers for the most popular plotters and printers and works with CGA, Hercules, EGA and VGA.

NDPFFT™ — Includes 40 fast running, hand coded algorithms for single and doubte dimensioned FFTs which take advantage of the 32bit addressing of the 386 or your hand disk. Caliable from NDP Fortran or NDP C with 1167 and 387 support. 3270 387FFT for 16-bit compilers \$250

387BASfC™ — A 16-bit Microsoft compatible Basic Compiler that generates tha smallest EXE files and the fastest running numeric code on the market. \$249

MicroWay * 80386 Support

Paratlet Processing

and stoppidier — Transputer development product name all MicroVity Transputer software using else in a refer of the product software using else in a refer of the protoppidies of the product of the proper of the product of the product of the proformance comparable to an 8036 running at 20 MHz with an mWH 167. The new 3L Parallel C and Fortran Compilers makes this an especially attractive porting environment. Can

especially attractive porting environment. Car be upgraded to 2 megabytes. Monoputer with T414 (0 MB) \$995 Monoputer with T800 (0 MB) \$1495

Cuedputer⁵⁰
This board for the XT, AT, or 386 can be purchased with 2, 3 or 4 Transputers and 1, 4 or 8 megabytes of memory per Transputer. Two or more Cuedputers can be linked together to use up to 36 Transputers. An or customer's real-time financial application has gone from 8 hours on a mainframe to 16 minutes on a systematic programmer or control to the customer's real-time financial application has gone from 8 hours on a mainframe to 16 minutes on a systematic programmer.

tem containing five Quadputers....from \$3495
Transputer Compilers and Applications
MicroWay and 3L offer Parallel languages for
the Monoputer and Quadputer.
MicroWay Parallel C....\$595

MicroWay Parallel C \$595
MicroWay Occam2 \$495
31. Parallel C \$895
31. Parallel Fortran
32. Parallel Fortran
34. Pa

Call (508) 746-7341 for our free catalog!

mW1167/20 510tSaver 51905 8087 599 8087-2 5154 80287-8 5239 80287-10 5256 80287-10 5256 80387-18 5475 80387-2 7725 80387-2 1705 80387-2 1707 80387-2

(All of our Intel coprocessors include 87Test.)

PC and AT Accelerators Way builds a number of 8086 and 80286

based PC accelerators that are backed up by the best customer support in the industry. Number Smasher** (8087 & 512K) \$499 FastCACHE-28619 MHz \$299 FastCACHE-28612 MHz \$499 SuperCACHE-28612 MHz \$499 Initial libbarg** PC (1 MB) \$950

Intelligent Serial Controllers

Mcrowey s A 1 and the ligent serial controllers on the market. They come with drivers for UNIX, XENIX, and PC MCS. AT4 ... \$795 AT8 ... \$995 AT16 ... \$1295

32-Bit Applications COSMOS-M/386 — SRAC's finite alement

package for the 80386 with an 80387 or mW1167 provides mainframe speed and capacity. Turn around times rivel the VAX 8850 and are 6 to 15 times that of an AT: from \$965 PST&T-386 — This mainframe statistic package has been used by government and inlanguage and the state of the state of the Package and the state of the state of the DPPIAQUAGE resolution of the state of the DPPIAQUAGE resolution of 800 engineering and scientific numerical algorithms. Salable from DPP Fortram . \$805



The World Leader in PC Numerics P.O. Box 79, Kingston, MA 02964 USA (509) 746-7341 32 High St., Kingston-Upon-Thames, U.K., 01-541-5466 St. Leonards, NSW, Australia 02-439-8400

■ POWER PROGRAMMING

apply the same sort of skepticism to claims about compilation speed. Although it's very popular right now to advertise compilation speeds of tens of thousands of lines per minute, anyone who writes and compiles individual modules more than a few hundred lines long would profit much more from learning something about structured modular code design than from buying a faster compiler. And when modules are kept down to reasonable sizes, the speed of the MAKE and LINK utilities and

 Readers should be warv of off-the-cuff judgments pronounced by programming language columnists (such as

the time required to load the compiler from disk become at least as significant as the number of compiler lines per minute.

myself).

Mr. Intersimone also stressed that readers should be wary of off-the-cuff judgments pronounced by programming language columnists (such as myself). Again I feel obligated to agree-though perhaps not for exactly the reasons put forth by Mr. Intersimone. This column and others like it are written under tight deadlines and space constraints, with a lead time of at least 90 days. There is usually not time or room to analyze products in detail, and worse yet, in today's fast-moving programming language market, statements about a product can be sadly out of date by the time they appear in print. So mistakes are bound to happen; all I can promise is that they will be rectified and atoned for properly when they occur.

THE IN-BOX Please send your comments and suggestions to me at any of the following e-mail addresses: PC MagNet: 72241,52 MCI Mail: lmi RIX: nluncan

Discover SimpLAN The Intelligent Printer Sharing Network



- Low cost network for sharing printers and plotters o Easy to install, simple to use
 - o User transparent operation
 - o All applications run without modification
 - o Automatic document separation and paper management Large number of users can be accommodated

For additional information, contact your dealer or call toil free: 800-445-6190 . or 408-746-2965 (Inside California)



1026 W. Maude Ave., Suite 305 Sunnyvale, California 94086 Fax - 408-746-2803

CIRCLE 230 ON READER SERVICE CARD

Genealogy

Lineage Master & Genealogy Bata Base Manager Call GeneaLogic Systems Toll Free 1-800-222-9409

rief today, increase your productivity over ANY other genealogy progr right be using. Lineage Master© will accept data from most other popul

Lineage Master© has features you will love!

CIRCLE 522 ON READER SERVICE CARD

Others offer the Ordinary in

Northgate speaks <u>quietly</u> and Delivers <u>Screaming Performance!</u>

What good is splashy color advertising when the systems others sell don't come near matching the performance or price of Northgate's blastingly fast Turbo Throughput family of Computers?

Don't let color ads color your perspective. Northgate advertises its systems in monochrome. We give you facts, everything you need to make a meaningful comparison.

And what we save in mono ads is another way we help keep your cost at rock bottom. (You'd be amazed at what color ads cost).

Hollow claims? Typical Computer Industry Puff? Well, take a look for yourself and see what the Experts say.

READ WHAT PC MAGAZINE SAID ABOUT NODTHCATES SOC

FIRST LOOKS

Northgate Power 386: Premium Performance at a Bargain Price

PC HANDS ON

BY BILL O'BRIEN

Field-leading 386 performance just got cheaper. Northgate Computer Systems' Power 386 rivals the power of the Compaq Deskpro 386/20 at a fraction of the cost.

The Power 386 is an upright, 20-MHz floor model with a base price of \$4,295—including a high-performance 65MB hard dick

A 64K static RAM memory cache deserves much of the credit for the Power 386's performance. Like the Deskpro 386'20, the Power 386 mainains a high-speed, 32-bit path to memory, separate from the

Whereas the 386/20 makes use of Intel's sophisticated cache controller chip, however, the Power 386 falls back on a direct-map static RAM system composed of discrete logic components. Compaq's solution no doubt earns it memory.

Nombage': Power Mil sports power and rest reinber at deep, sing with adult are tipy light hander or rept alon.

Speed as which he information is set tailly passed across the bus and the more important measure of performance, reasts as when her disks caching is enabled. But even without a caching, a her about the set of the set o

access performance gains in some cases, but the Power 386 won't be far behind. The hard disk drive does not

The hard disk drive does not have an overly spectacular track-to-track access time—28 milliseconds—but that is a mechanical measurement of disk capability. Data throughput, the

large- and small-record times for the PC Labs benchmark tests rank the Power 386 ma-

rower 386 machine right up there with the Compaq Deskpro 386/20. The standard configuration includes a 14-inch monochrome

monitor, one 5%-inch 1.2MB floppy disk drive, and one 3½inch 1.44MB floppy drive. That leaves you with one empty halfheight bay. Whether you purchase

FACT

Northgate Power 386 Northgate Computer Systems 13895 Industrial Park Blvd.,

#110 Plymouth, MN 55441 (612) 535-0111 List Prices With I MB DRAM, 64K SRAM cache, one 5W-inch L2MB Roppy disk drive, one 3W-inch 1.44MB Roppy disk drive, of 55MB hand disk, monochrome monitor, 54.295. In Short: The Power 186 delivers top performance and intelligent design as an excellent price.

this 386-based machine for its performance, the chances are that you won't be disappointed. Watch Microsoft Windows load quickly for a change, or observe a pull-down menu snap up like a runaway window shade, and you will finally get an honest feel of what speed is all about.

*NOTE: Reprinted in full without editing, to give you the complete picture.

© PC Mag., July 1988, Ziff-Davis Communications (

OTHER EXPERTS AGREE...

Steve Gibson, InfoWorld, 3/21/88
"Its no coincidence that (the) 386 Northgate Tower is Steves
Dream Machine...(it is) the best possible personal machine
for the least possible money."

Computer Shopper, 6/8

"The Northgate 386 Tower is an impressive system. Operating approximately eighteen times faster than the original PC..."

S-C-R-E-A-M-I-N-G Color Ads



BOTH SYSTEMS INCLUDE:

65MB Hard Drive/16 Bit Controller for Turbo Throughput Performance • Both 1,2 and 1.44 Floppy Drives (read and write all formats) . 1MB Ram . 14" PAPER WHITE FLAT SCREEN MONITOR • DOS 3.3 • Vopt • Disk Catching!

Plus...The Spectacular Omni Key/102 Keyboard at no ext

	ı
	П
Compare Anywhere!	ıŀ
FEATURE-FOR-FEATURE	ı,
Your Computer Dollars	
Simply Buy More	П
When You Buy	
NORTHGATE	П

STANDARD ON BOTH 286 & 386		
I megabyte RAM Saleto - 6 26-80T AND 2 6-80T MOST societ	 Herculus compatible graphics card with parallel cort 	
Setup in BUM	■ 10 card w/1 parallel, 1 serial	
RLL Turbo Throughput' 65 Megabyte Pland Disk	 15 bit memory expansion to 15 meg 	
12m 525" DUAL DENSITY Proper	Mis-DOS 33 & GW-BASIC Hard Drive caching.	
144m 35" DUAL DENSITY	Golden Bow VOPT dink grainster	
W' flat screen exertion (choice of white or uniter)	■ Northgate OBENG NETS 1912 Inntroped	

ra cost.	
ARD on 386	0
Wait State BASE CACISE	■ 15M3
TOWER CASE up optional)	B BGA
22 bit Double processor	■ EGA
Real time clock	• Mon
upport it	B Cop
	■ Gaz

OPTIONS for 286 & 386		
MMHz (for 366 Model)	ions 4637W	
RAM upgrades to M MegaByte	Tree .	
EGA	499	
BGA+	#75GP	
Larger, Paster RLL drives	call	
Monster ESDI drives	call	
Internal Tape Backup	MG3501	
External Tape Sackup	16060	
Co-procussors	cali	
Game Port	1,53300	
Second Serial port	#3500	
Extended Warranty	cali	
On Phy Mulaterana		

Countless Fortune 500 Companies (List on request), Colleges, Universities and Government Agencies regularly buy Northgate Systems. They've discovered Northgate delivers more bang for the buck!

Industry-leading performance (we can prove it) at unbeatable prices make Northgate the new leader in state-of-the art computer performance technology If you're spending your money, don't you owe it to yourself to make us prove our claims?

All Northgate Systems are backed by our unique "OVERNIGHT BY AIR AT OUR COST" policy on any failed components; One-year Limited Parts AND LABOR warranty. Tech Service on systems is free and unlimited. Once you discover for yourself that Northaate means what it says in our ads, you too will choose Northaate.

Toll-Free Order Number Fax No. (612) 553-1695

CALL 800-54

Hours: M-F 8 a.m.-7 p.m. CST, Sat. 9 a.m.-2 p.m. CST

THERE ARE FOUR WAYS TO MEASURE THE SPEED OF A LAN.



Ours only wins in three of them.

4. How fast does it install. We have no competition in this category LANLink SX installs.

we have no competence in this caregory EuroLink SA instant in about fifteen minutes, and it doesn't take a technician to do it. Since LANLink SX uses standard parallel or RS-232 serial ports, Installing a network means little more than connecting the cable and loading the software.

With hardware LANs, installation can easily take two daysone to set it up and one to tweak it. And it also takes someone who really knows what he's doing. That is, someone expensive.

2. How fast does it transmit.

Okay, this is the category we don't win: the hardware LANs are generally a little quicker. At least, they are under optimal conditions, which is how they rate themselves.

But LANLink 5X is pretty quick, too. At half a megabit per second.

But LANLink 5X is pretry quick, too. At half a megabit per second it's way out ahead of any other software LAN, and right at the heels of the hardware types. Which, of course, are far more expensive.

How fast does it maintain.

The real cost of a network is not so much the initial price as it is the continuing outlay for maintenance-adapting it to changing needs. Into a multi-tasking controller, driving a truly expandable LAN that is easily and quickly upgradable.

A hardware LAN on the other hand, becomes obsolete as new

technology is introduced. And, to keep the network up and running as applications change, you need the attentions of a technician, on a continuing basis. A very well-paid technician.

4. How fast can you pay for it.

Now we've arrived at the bottom line, where LANLink 5X is toughest to beat. You can install a five-user LANLink network for about the same cost as the LAN board in a board-driven network On top of that, factor in what you save on installation and mainte

nance time, and the difference is pretty dramatic.

LANLink 5X is available immediately and it comes with a money-back marannee. Its price of \$595 includes a server and a satellite

module plus the network operating system. Additional satellines are available for \$125.

For complete details on the fast-

est software-driven network available, call 800-451-LINK. LANLink 5X. Because three out

of four ain't bad. THE SOFTWARE LINK

3577 Parkway Lane, Norcross, GA 30092 (404) 445-5465 FAX (404) 263-6474

SPREADSHEET CLINIC



A mysterious, undocumented 1-2-3 macro command; a serious bug in Borland's Quattro: new ways to display string formula results; and improved macros for returning to cells.

QUATTRO BUG

the function

There's a serious bug in Borland's Quattro. When Quattro recalculates a formula that includes an @D function referencing a criterion containing one of its conditional operators (<,>,=,<,>=, or <>), it often returns the wrong result. Specifically, Ouattro ignores functions and references to cells outside of the database that follow the @D function. Moreover, if the problem-causing @D function is followed by another @D function, the formula returns the value ERR. The simple database worksheet that is

shown in Figure 1 will illustrate the problem Cell B14 of this worksheet contains @DSUM(A1..A6.1.B8..B9)

Since cell B8 contains the field name Balance and cell B9 contains the criterion +B2>0, this function returns the value 170-the sum of all the entries in the Balance field that are greater than 0.

Cell B15 contains the function

@DSUM(A1..A6.1.B11..B12) Since cell B11 contains the field name Bal-

ance and cell B12 contains the criterion +B2<0, this function returns the value -150-the sum of all the entries in the Balance field that are less than 0.

Now suppose you want to calculate the net receivables-the total of the receiv ables less the total of the payables. You could do this in a variety of different ways (other than the simple +B14+B15). First, you could use a single @DSUM function | Figure 1: This worksheet demonstrates a that references a blank criterion range. Al- problem with Quattro's @D functions.

tematively, you could use any of the following formulas:

GDSUM(A1..A6,1,B8..B9)+B6 @DSUM(A1 .. A6,1,B8 .. B9)-150 +B14+@DSUM(A1..A6,1,B11..B12) +B15+@DSUM(A1..A6,1,B8..B9)

Each of these formulas would return the value 20-the correct result. You should also be able to calculate this

result with the following formulas: @DSUM(A1..A6,1,B8..B9)+B15 @DSUM(A1..A6,1,B11..B12)+B14

@DSUM(A1..A6,1,B8..B9) -@DSUM(A1..A6,1,B11..B12) However, each function returns incorrect results. Quattro ignores the +B15 in the

first formula and returns the value 170, and it ignores the +B14 in the second formula and returns the value - 150. Since the third formula contains two @D functions, it returns the value ERR.

David Lund Minneapolis, Minnesota Mr. Lund is correct. When Quattro evaluates a formula that contains an @D function referencing criteria containing logical operators, it ignores any functions (other than @D functions) and references to cells outside the database if they follow that @D function. If the @D function is followed by another @D function (even one that references only exact-match criteria). the formula will return the value ERR. Borland is aware of this bug and will correct it in a future release of Quattro.

SAVE AND RETURN-AGAIN

Like many 1-2-3 users. I often need to return the cell pointer to the position it occupied at some previous time. Several macros presented in previous issues of Spreadsheet Clinic have addressed this problem, but none produce precisely the

For example, although "return" macros move the cell pointer to the position it occupied when you executed the "save" macro, they do not shift the same screenful of cells onto the screen that were visible when you executed that macro. Unless the cell on which the cell pointer was positioned when you invoked the save macro is visible when you invoke the return macro. 1-2-3 will shift the worksheet so that cell is in the upper-left corner of the screen.

The macros shown in Figure 2 solve this problem. The "save" macro, named \s, saves the address of the cell in the upper-left corner of the screen as well as the address of the cell on which the cell pointer is positioned when you invoke the macro. 1-2-3 automatically determines the latter

1	Company	Balance	
2	ASC Enterprises	\$10	
3	COS Incurporated	\$25	
4	BCD Construction	64	
5	DEF Limited	\$135	
•	EFG Engineering	(8150)	
7			
	CRITERIOS RAPOR \$1:	Balance	
,		1	
18			
11	CRITERIOS BARGE \$2:	Balance	
12			
13			
14	Total Receivables:	2179	
15	Total Perables:	(\$156)	
16	-		

■ SPREADSHEET CLINIC

Figure 2: These macros allow you not only to return the cell pointer to a cell it previously occupied, but also to bring into view the same portion of the worksheet that was visible when the cell pointer was on that cell.

```
F
1
              (Let CURRCELL, @CELLPOINTER("address"))
2
              {BigRight}{BigLeft}
3
              {Let LEFTCELL, @CELLPOINTER("address")}
4
              {Goto}{CURRCELL}
5
6
    CURRCELL
7
R
    LEFTCELL
9
10
   ١r
              {Goto}{LEFTCELL}
              {Goto}{CURRCELL}
12
```

Figure 3: These macros return the same columns to the screen that were visible at a previous time.

address and stores it in the cell named CURRCELL. You must type the address of the cell that appears at the upper-left corner of the screen. 1-2-3 stores this address in the cell named UPLEFT.

The "return" macro, named v, returns to the screen the same portion of the work-wheet that was visible when you invoked the save macro. He moves the cell pointer to the cell in which it was positioned at that me. Unless the cell whose address is you invoke this macro, the first statement in this macro shifts the worksheet so that cell is in the upper-left corner of the screen. Then, the second statement will move the cell pointer to the cell whose address is stored in CURRCELL, without shifting

Rod Schlindler Renton, Washington

Being able to return the same portion of the worksheet to the screen that was visible at a previous time is useful. However, it's inconvenient to have to type the address of the cell that's located at the upper-lefthand corner of the screen.

Althaugh we don't know a way to make 1-2-3 save the address of the cell at the upper-left corner of the screen automatically, we do know haw to make it save the address at the left edge of the current row. Doing this enables the return macro to shift the same columns into view that were

shift the same columns into view that were visible when you invoked the save macro. The macros shown in Figure 3 represent this technique. The first statement in the save macro saves the address of the current cell (the one over which the cell pointer is positioned at the time) into the cell named CHRCCELI.

The second statement simulates a Ctrl-Right Arrow and a Ctrl-Left Arrow keystroke. The first combination maves the cell pointer to the column that was immedi-

stroke. The first combination maves the cell pointer to the column that was immediately beyond the right edge of the screen. The second combination then moves the cell pointer one screenful of columns to the left, so that it is positioned in the column that was originally at the left edge of the screen.

Once 1-2-3 has moved the cell pointer into this column, it executes the third state-

meat in the macro, which saves the position of the cell pointer (the address of a cellin the column that was at the left edge of the screen when you invoked the macro) in the cell named LEFTCELL. The final statement moves the cell pointer back to its original position. At this point, the screen will look exactly as it did before you executed the save more.

When you execute the return macro, 1-2-3 first shifts the worksheet so that the columns that were on the screen when you executed the save command are once again visible. Then the cell pointer is moved to the cell it occupied when you invoked the save mucro. Consequently, the cell pointer will be on the same cell that it previously occupied, and the same rows will be visible on the screen.

ALIGNING STRING FORMULAS

I-2-3 always left-aligns the results of string formulas. For example, if cell Alcontained the centered label "Test and another cell had the formula +AI, I-2-3 would display the characters "Test" in that cell, aligned with the left edge of that cell.

In most cases, this alignment poses no problem. In some cases, however, I want to center or right-align the results of string formulas. Recently I've found a way to do this. To center the result of a string formula, I embed it within the formula

Similarly, in order to right-align the result of a string formula, I embed it within the formula

GREFEAT(" ",@ROUND(@CELL("width",cell)@LENGTH(@TRIM(formula)),#))
40TRIM(formula)

In both cases, cell represents a reference to a cell in the same column as the one into which you are entering the formula (prefearably, the cell immediately above it), and formula represents the formula or function whose string result you want to align, or a reference to a cell that contains that formula or function.

For example, if you entered the formula @REFERT(" ",@ROUND((@CELL("width",B1)-@LENGTH(@TRIN(A2)))/2,#))4@TRIN(A2)

in cell B2 while cell A1 contained the label
Test, 1-2-3 would display the characters

GENERIC ANNOUNCES NEW LEVELS OF CADD SOFTWARI



BECAUSE ONE SIZE NEVER FITS ALL

It's gotten to the point where software is either too underpowered to get the job done or too complicated to use.

That's why we've developed new Generic CADD Levels software. Three different programs for IBM® PCs and compatibles that let you choose the level that fits your needs exactly.

What if your needs' change? Just move up to the next level. Since every level works the same way, once you learn one it's easy to learn the next one.

GENERIC CADD LEVEL 1™

is just right if you're getting into CADD. It's an amazingly powerful package for only \$49.95*. Yet it's simple to use and it can run on a two-floppy system.

GENERIC CADD LEVEL 2™

adds enhanced editing capabilities like automatic English or Metric dimensions, extension lines, arrows, and single line snaps and trims—all for \$99.95°. Level 2 is perfect when you need a little more performance.

GENERIC CADD LEVEL 3™

is our fully featured package. Its advanced features include hatches and fills, poly line snap and trim, dynamic drag, macros, and EMS support for bigger drawings. This professional program has everything you need if you work with CADD every day. And you get all these features for just \$199.95.*

Send for our free CADDalog™

To find out more about our new Levels software—as well as other Generic products—call or write for our free CADDalog.

Call 1-800-228-3601.

Or write Generic Software, 8763 148th Avenue NE, Redmond, WA 98052.



Generic

CLE 506 ON READER SERVICE CAR

The Hard Drive Specialists.



"Lifetime Memory Products also get your money's worth in terms of looks like one of the better mail- warranty, technical support, and good order sources for fixed disks. You treatment from the sales staff."

not only get good hardware, you - Walt Rowinsky, PC Magazine Dec. 8, 1987

Premium Performance





MiniScribe 110MB Full Height: 28ms access time RLL-certified

Model 6128 hard drive 7.5Mbit per/sec RLL dual hard drive/floppy controller



FOR YOUR AT® OR COMPATIBLE Introducing the Seagate ST251-1: 40 megabytes and 30ms access time at an incredible price. Features half-height, 5.25-inch size. The Kit Includes:

- Seagate Model ST251-1 hard drive
- Installation manual Cable
- · Lifetime Backup Utilities and manual

FOR YOUR PC/XT® OR COMPATIBLE The new MiniScribe® 3650: 40 megabytes of fastaccess (61ms) storage space at a fraction of the cost of two 20MB drives. The Kit Includes: MiniScribe Model 3650 hard drive • Installation manual

- · Hard drive controller and cables
- · Lifetime Backup Utilities and manual







	48-Hour	Sivty
71MB MiniScribe	, 28ms	\$749
I3MB MiniScribe	, 25ms	\$569
	, 61ms	
10MB Seagate, 30	ms	\$459
20MB Seagate, 65	ms	\$249
nstallation.		•



PC KITS: Our kits come complete with a hard drive, controller card, mounting hardware, cables,

and managed manage.	
20MB MiniScribe, 65ms	\$279
20MB Seagate, 65ms	
30MB Seagate, 65ms	\$305
40MB MiniScribe, 61ms	
60MB MiniScribe, 61ms,	RLL\$415

CDC 150MB Full Height: · 18ms access time ESDI-certified

hard drive · 10Mbit per/sec ESDI dual hard

drive/floppy controller • 1:1 interleave controller \$1649



Maxtor 338MB Full Height

· 16ms access time ESDI-certified hard drive

· 10Mbit per/sec ESDI dual hard drive/floppy controller
• 1:1 interleave controller \$2550



HARD DRIVE Lifetime Backup Utilities -

Backs up, compares, and restores your files. Easy to use, reliable, and fast!

Sixty-Day Money-Back Guarantee NO CHARGE FOR UPS GROUND SHIPPING

Free UPS ground shipping within the continental USA. Texas residents add 8% sales tay Sixty-day, money-back guarantee does not include freight. Prices are subject to change without notice.

National Sales: 800-622-8001

In Texas: 1-800-288-4445 Monday - Friday: 8am - 9pm CST Saturday: 9am - 5pm CST Customer Service: 1-512-335-7598 Monday - Friday: 8am - 7pm CST

Lifetime Memory Products

12611 Research Blvd. #400 Austin, Texas 78759

CIRCLE 341 ON READER SERVICE CARD

■ SPREADSHEET CLINIC

"Test" in cell B2, centered within that cell. If you entered the formula

@REPEAT(" ",@ROUND(@CELL("width",C1)=
@LENGTH(@TRIM(A2)),0))40TRIM(A2)

into cell C2, 1-2-3 would display the characters "Test" in cell C2, aligned with the right edge of that cell.

Dean Slack

Columbus, Ohio

Although these formulas are complex, they are the only way we know of to center or right-align the results of string formulas that don't require you to replace the string formulas with their results.

THE (IFKEY) COMMAND While working with 1-2-3, Release 2.01,

recently, I discovered an undocumented macro command: {IfKey}. The form of this command is

{IfKey argument}

where argument is a literal string, a stringproducing formula or function, or a reference to a cell that contains a label, a stringproducing formula, or a string-producing function. For example, {IfKey "TEST"} is a valid macro command, as are {IfKey Al} and {IfKey @LEFT(Al,1), if cell Al contains a label or a formula or function that tretums a string.

Like the [ft] command, [ftKey] can be either true of labe. An [ftKey] command will be true if its argument specifies one of the following single characters: 1, r. u. d., L. R. U. D. (;), or - When an [ftKey] command is true, 1-23 will execute the next command in the cell that contains [ftKey]. An [ftKey] command with the lake it is argument refers to any other character or group of characters. When an [ftKey] has the command of the cell that contains [ftKey] are standard or group of characters. When an [ftKey] has the cell that containing commands in the cell that containing commands in the cell that contains [ftKey].

Figure 4 contains a simple macro that

	A	B	c	D
1	\a	(Get KEY)	-	
2		(IfKey KE	Yl(Beep)	
3		(Branch \	a)	
4				
5	KEY			
2				

Figure 4: This macro will beep if you type l, r, u, d, L, R, U, D, {,}, or -.

demonstrates this. The first command tells the program to wait until you press yek. When you do. 1-2-9 laces the macro representation of that key into the cell named KEY (BS). The [IfKey) statement in cell B2 test the character in KEY, if it is not B2 test the character in KEY, if the third is the character in KEY, if the character in KEY, if the character in KEY, if the statement will be true, 1-2-3 will be the macro. If you press any other key, the life was the character has did to the beginning of the macro without beauth of the beginning of the macro without beauth of the state of the beginning of the macro without beauth of the state of the state of the beginning of the macro without beauth of the state of

I recently discovered an undocumented macro

command, {IfKey}, in 1-2-3, Release 2.01.

Although I've determined what {IfKey} does, I haven't found a useful application for it. Overall, I'm not surprised that Lotus didn't document it.

Sonal Desai Evanston, Illinois

Like Ms. Desai, we can't think of any situation in which we d want to test for the 11 characters that make the (lifk we) command light on this mysterious command. Also command with the west of the w

CONTRIBUTE TO THE CLINIC

Share your latest spreadsheet discovery through PC Magazine's Spreadsheet Clinic. We'll pay you \$50 or more for anything we print, plus an extra \$25 if you submit your letter on a disk, together with a print-out. Mail your contributions to Spreadsheet Clinic, PC Magazine, One Park Avenue, New York, NY 10016.



"A Word Crunchers Dream" —PC Magazine June '87



IN FULL TEXT RETRIEVAL SEARCH 5000 TEXT FILES IN 5 SECONDS

RATED 9.3

Find any info created by all the popular ward processors or ASCII files in seconds. Highlights

Comprehensive Searches
 Create a search sequed with any combination of AND, OR, NOT, and WiTHIN (WITHIN refers to prosenty) Search information on a 20MB Hard Disk in seconds. Watis with

CompuServe as well as other programs such as LOTUS or dBase III. Wild Cords • Highlight Mark & Save • Phrase Search

zyHNDEX Professional searches up to 5000 ZyHNDEX Plus searches up to 15,000 files with IAN canobilities

TyfEATURES \$ 95
thesourus/macros/field search
Call for Demo Diskette

(312) 632-1100

ZYLAB Corporation

3105-T N. Wilke Road • Arlington Hts. IL 60004



THE REAL PROPERTY.
IBM
PERSONAL SYSTEM/2
Model 30 w/2 floppy\$1250
Model 30 w/1 floppy & 20 mg1795
Model 50 - 20/302695/
2795
Model 60 - 40/703425/
Model 70 - 604425
Model 80 - 404375
70 4875 115 6995
90 day warranty through Bulldog

COMPAQ 386 Desk Pro 40/60/130

\$449	5/5450/6950
286 Desk Pro 12 m	hz1695
Compaq II Model IV	/2879
Compaq Port. 386	
Model 40/100	5699/7199
Compaq III	
20mb/40mb	3595/4195
VGA Monitor	549
VGA Card	469

90 day warranty through Bulldog

MATH COPROCESSO	
803-87-20	\$75
803-87-16	47
802-87-8	24
80287-10	
8087-3	11
8087-2	14
256K Chine	Co

64K Chips.

COMPATIBLE

Ram, serial/parailel port, clock calendar, DOS ... \$1935

Wyse 386 system, 1.2 floppy, 1 m.b. Ram, serial/parailel port, clock calendar, DOS ... \$2635

All Wyse Systems carry a 1 year manufacturers warranty — parts and labor.

LAPTOPS

	NEC Multispeed EL	
	NEC Multispeed HD.	.2299
	Toshiba 1000	750
ı	Toshiba 1200	2349
	Toshiba 1200F	
	Toshiba T1100 Plus	
	Toshiba 3100	
	T3200	
ı	T5100	4895
ı	Zenith 183 w/20 mh	2050

GRAPHICS CARDS	
ATI VGA EVEREX MICRO ENHANCER	\$26
EVEREX MICRO ENHANCER	13
GENOA SUPER HI RES	17
HERCULES GRAPHICS	18
HERCULES IN COLOR	
ORCHID DESIGNER VGA	26
PARADISE Auto Switch 480	15
PARADISE VGA Plus	
QUADRAM EGA PLUS	16
OUAD PRO SYNC	20
SIGMA COLOR 400	29
NEC GB-1	20
NEC MVA	79
STB CHAUFFEUR HT	13
STR Multi Res 11	16
VEGA DELUXE	18
VEGA DELUXEVEGA VGA	26
MULTI FUNCTION BOAR	DS

5	AST Advantage w/128K	\$22
	AST Advantage Premium w/512K.	31
П	AST 6 PACK PLUS w/384K	20
П	AST 6 PACK PREMIUM w/256K	19
п	AST 5251-11 PLUS Enhanced	58
,	AST RAMPAGE 286	37
1	AST RAMPAGE 286-2	
)	for MODEL 50/60	45
1	AST RAMPAGE 286-2	
п	for model 50/60	45
٧,	AST HOTSHOT	35
,	EVEREX MINI MAGIC w/o K	5
	FAST 88/V20 w/Switch	8
ı,	INTEL Above 286 w/512K	36
	INTEL Above PS286 w/512K	39
1	INTEL Inboard 386 w/Adapter	104
ı	INTEL Inboard 386 for PC w/mb	69
-	INTEL Above Board II	
П	for PS/2 w/o K	25

9	MICE &MISC	
0	GENIUS MOUSE GM6+\$5	
9	MICROSOFT w/windows14	
5	MICROSOFT MOUSE	
0	w/PC paint brush11	
5	MOUSESYSTEMS MOUSE	
5	LOGITECH MOUSE C7 Plus	
5	KODAK DATA SHOW w/Cooling Fan75	
0	MICROFAZER II w/64K22	

IRMA BOARD II

ORCHID JET 386 w/adapter

ORCHID PC Net Starter Kit

ORCHID Ramquest w/1mb. ORCHID Twin Turbo.....

ORCHID Tiny Turbo 286...

Acces Subject To Change For Orders Call: 1-800-438-6039

Call





975

735

269

525 389

For shipping & technical call: (404) 860-6905 or (404) 860-7364

EPSON Seagate 20mb w/contr. ST225 \$269 LX 800 180 CPS, 30 NLO \$189 Seagate 30mb w/contr. ST238 Seagate 30 mb for AT ST4038 .289 .465 FX 86E 240 CPS, 40 NLO 339 FX 286E 240 CPS, 40 NLQ 439 Seagate 40 mb for AT ST251. 369 FX 850 New!.... 339 FX 1050 New!. 479 LO 500 180 CPS, 60 NLQ 339 Toshiba 3½" 720K int.... Toshiba 3½" 1.44 mb int. Toshiba 5¼" 360K int.... Toshiba 5¼" 1.2 mb int... LQ 850 330 CPS, 88 NLQ. 519 LQ 1050 330 CPS, 88 NLQ 739 11 849 LQ 2500 324 CPS, 108 NLQ polis 70 mb EX 800 300 CPS, 60 NLQ. 439 BERNOULLI PLUS Special Tractor for LO1000...20 BERNOULI BOX II 51/4 20 mb internal w/card OKIDATA 339 320 300CPS, 62 NLQ... duai 20 mb external w/card 321 300 CPS, 62 NLQ 465 SYSGEN Durapack single... dual external/internal 1695/139 390 24 pin 270 CPS, 90 LO 465 Plus Hard Card 40 639 391 24 pin 270 CPS, 90 LQ Plus Hard Card 20 229 182 Plus 180 CPS, 30 NLQ. Priam 60 mb AT 76 192 Plus 200 CPS. 339 Priam 43 mb AT 193 Plus 200 CPS. 439 MODEMS 292 Plus 240 CPS, 100 NLQ 439 79/1 Everex 1200 int/ext 575 293 Plus 240 CPS, 100 NLQ Everex 2400 int./ext. 809 Hayes 1200/2400 Migent Pocket Modem 294 Plus 400 CPS, 100 NLQ 393 450 CPS, 120 LQ... 925 Practical Peripherals haif card TOSHIBA 2400 w/Pro 321 SL 216 CPS, 72 NLQ US Robotics 2400 direct internal 469 Ventel Half Card 1200 w/Crosstalk... 351 SX 350 CPS, 100 NLQ. 950 Vental Half Card 2400 w/Crosstalk 341SL 216 CPS, 72 NLQ.. 615 1200/2400 Plus 239/3 NEC 2200. 339 AMDEK P6/P7 465/619 410_ P5XL/P9XI 850/1030 Color 722 775/1020 3550/8850. PRINCETON MAX12 PANASONIC HX12. 1080i Model II HX12E 44 1091 Model II. 209 HX9_ 1092 339 5 Uitrasync. 1524 565 IRM \$19 415 Mono 8503. 1595 479 Color Dispiay 8512 4 5 285/439 Color Display 8513 \$565 Color 8514. 1150 1524.... Magnavox RGB80 HEWLETT-PACKARD NEC 1695 NEC MuitIsvnc II. 589 aser Series II Maynstream 60 PS/2 w/card for model 50 60 & 80..... NEC Multisync Plus 889 DICONIX 150 325 NEC Multisync GS 199 NEC Multisync XL 19 2075 OTC 850 CPS 1725

DRIVES

PRINTERS

Bulldog's ices are

5	COETWARE	
5 9 0	SOFTWARE Aldus Pagemaker	
'nΙ	Aldus Pagemaker	.\$459
ĕ	Chartmaster,	205
5	Clipper	379
٩I	Corefast	99
5	Crosstalk XVI	99
5	D Base iii	379
5	DBXL Enable 2.0 w/Perspective	125
Ĕ	Enable 2.0 w/Perspective	3/9
5	Fastback Plus	105
9	Foxbase +	199
έI	Freelance Plus	329
5	Framework II	379
ģ.	Harvard GraphicsIBM Display Write IV	279
7	IBM Display Write IV	289
-	Lotus	309
5	Lotus Hal	49
9	Managing Your Money 4.0	125
9	Microsoft Word 4.0	229
5	Microsoft Excel	329
	Microsoft Windows 386	135
9	Microsoft Works	129
91	Multimate Advantage II	269
9	Multiplan Office Writer 6.0	135
9	Peachtree ii Complete	239
9	PES Prof Write	149
	PFS Prot Write	145
	PFS Prof File	145
-	PFS 1st Choice	89
5	Quantro R Base for DOS	149
5	K Base for DOS	439
-	Revelation Super Calc IV 1.0	469
9	Super Calc IV 1.0	Z69
9	Symphony 1.2 Ventura Desktop Publishing	439
9	Ventura Desktop Publishing	499
	Word Perfect 5.0	199
5	Wordstar 2000 + 3.0	239
9	Wordstar Pro 4.0	
и	Everex 60 m.b. int.teac	
9	Everex 60 m.h. int teac	\$550
9	external teac	645
5	Cases Calaus 60 mh internal	795

external

external.

Achives 40 mb internal

Suspen Quic 60 internal...

Everex 60 mb Wangtec int

Everex 60 mg Wangtec ext Sales Hot I

VISA 3241-E Washington Road . Martinez, Georgia 30907 For returns call: (404) 860-6899 In Georgia call: (404) 860-7364

339 705

755

699 799



Introducing Sharp's newest computer projection panel.

Observe.Sharp has just turned the personal computer into the group computer.Educational.business, or government groups. Groups involved in sales presentations, training sessions, even computer instruction. Now all of them can benefit from the immediacy of a PC.

Sharp's new QA-50 gives you the flexibility to change your presentation at the last minute in

the office, on the plane, even at the presentation itself.

Used with a standard overhead projector, it projects computer images (both text and graphics) of exceptional clarity and brilliance. That's because it's the only computer projection panel with a double super twisted LCD, 640 x 480 resolution and 8 shades of gray.

Besides being compatible with key computers like IBM's PS/2° (VGA) and PC/XT/

AT° (EGA and CGA), the fan cooled QA-50 is also people compatible: with its wireless remote, it's easy to use, lightweight, and reliable. Sold and backed by Sharp's Professional Products Dealer Network, its price/value picture will SHARP make you look as brilliant as our projections.

e you look as brilliant as our projections.

The Sharp OA-50. It makes big ideas look even bigger.





tional Business Machines I

USER-TO-USER

BATCH files that return you to the directory where you started; restricting applications to running only once every day using standard DOS commands.

SHOW ME THE WAY TO GO HOME

It's often necessary within batch files to change the current directory and/or drive, perform some task, and then return to the original directory. For example, if you are using graphics with WordStar 2000, Version 3.0, you must change directories to the \WS2000\GRAPHICS directory in order to execute and load the INSET graphics module. The challenge is to return to the same drive and directory from which you started.

I developed a technique to do this using the DOS redirection facility. The batch file RETRNDEM.BAT, shown in Figure 1, saves the current directory and drive in a file. To return to the original drive and directory, the main batch file just calls this

> R. Shaw Bridges London, England

Mr. Bridges's batch file was specific to the WordStar 2000 example mentioned above. I modified it into a demo file anyone can try. Once you've seen how it works, you probably won't use RETRNDEM .BAT-rather, you'll incorporate the technique into your own batch files. Before you can use RETRNDEM.BAT, you must create the file CD.TXT. Create it in the root directory of your hard disk so that you can find it easily. Enter the following at the DOS command line

COPY CON C:\CD.TXT CD ^z

That is, type "CD" and a space, hit Ctrl-Z, and press the Enter key.

How does the batch file work? Lines 1, 2. and 3 check to see that CD.TXT exists and that you've passed two command-line parameters. The parameters must be a drive letter and a path on that drive. Line 4 copies CD.TXT to a file called RETURN .BAT in the root directory of the drive you specified. In line 5 we use the CD command with no parameters to record the current drive and directory in RETURN .BAT. The >> redirection symbol says to append output to the specified file, so at

this point RETURN.BAT contains "CD" followed by your current path. Line 6 switches to the root directory of this point the contents of RETURN.BAT might look like

CD D:\PCMAG\USR2USR

Line 8 switches to the drive you specified on the command line, and line 9 changes to your chosen directory on that drive. It doesn't do anything there-this is just a demo. To get back to the starting point, line 10 calls RETURN.BAT. If your DOS version is earlier than 3.3, replace the line

CALL \RETURN.BAT

your current drive and line 7 stores the current drive letter in RFTI/RN RAT At COMMAND /C \RETURN

```
ECHO OFF
    IF NOT EXIST C:\CD.TXT GOTO NEEDCD
123
```

IF %1x==x GOTO SYNTAX (3) IF %2x==x GOTO SYNTAX

{4} COPY C:\CD.TXT %1\RETURN.BAT

(5) CD >> %1\RETURN.BAT (6) CD\

(7) CD >> %1\RETURN.BAT (8) %1

CD %2 (10) CALL \RETURN.BAT (11) DEL %1\RETURN.BAT

{12} GOTO END {13} :SYNTAX

{14} ECHO SYNTAX: "RETRNDEM [drive letter] [path]"

(15) ECHO For example, "RETRNDEM C: \PROG\COMM" {16} GOTO END

(17) :NEEDCD

(18) ECHO To use RETRNDEM.BAT, you must create the file C:\CD.TXT {19} ECHO as described in the text.

{20} :END

Figure 1: RETRNDEM.BAT changes drive and directory, then returns to its starting point

■ USER-TO-USER

Line 11 cleans up by deleting RE-TURN.BAT and line 12 jumps over the er-

DOS ignores the final "\".

That's it. Naturally, if you have specific programs that need to use this technique, you'll explicitly fill in the drive and path rather than taking them from command

line parameters.
In the May 27, 1986, Programming/ Utilities column, PC Magazine offered two utilities called PUSHDIR and POPDIR.

which let you save the current drive and directory on a "stack" and restore them later. They have the advantage of allowing multiple levels of saved directories. The batch file technique described here is helpful because it accomplishes most of PUSH-DIR's work using standard DOS com-

mands.— Neil J. Rubenking ONCE-A-DAY BATCH FILES

I wanted a way to execute a program once a day, no matter how many times I restart my computer. To accomplish this, I insert these two lines last in my AUTOEXEC .BAT file:

ECHO | HORE | DATE > READDATE.BAT
READDATE

The first line redirects the output of the date command to a file named READ-DATE.BAT. The second line executes the READDATE.BAT file just created. When the READDATE.BAT file is executed. DOS will attempt to execute a batch

file named CURRENT.BAT [because the READDATE.BAT file contains the output of the DATE command; for example "Current date is Thu 4-07-1988"—Ed.].

The CURRENT BAT file contains the following statements:

IF EXIST \$4.XXX GOTO END

IF EXIST %4.XXX GOTO END RENAME *.XXX %4.XXX ONCEONLY

:END

The fourth parameter contains the current date [1*40-1988" in the previous example—Ed.]. This string, when combined with the file extension. XXX, is used as the filename to look for, if it exists, CUR-RENT branches to the label END. If not, the previous. XXX file is renamed to today's date plass an XXX extension, and the ONCEONLY.BAT file is executed. ONCEONLY contains the lines.

ECHO OFF ECHO This betch file gets ECHO executed only ONCE each day



In her job interview she'll tell you all about her MBA.



If you want to know about her THC, coke and crack, you'll have to dig a little deeper. One in six working Americans has a drug problem. And, as a corporate executive, that means you have a problem.

Because studies show that the producitivity of drugimpaired workers is 25% lower than that of non-users. And workers on drugs are a hazard to their fellow employees. They cause accidents and make mistakes. They call in sick more often. And file more workman's compensation claims.

Yet most drug abusers don't believe they even have a problem. What can you do to identify and help drug abusers among prospective and present employees? Start by caliing the National Institute on Drug Abuse Workplace Helpline for CEOs and managers. We'll tell you what you can do

to deal with drug abuse problems in your company. Call today: 1-800-843-4971. From 9:00 a.m. to 8:00 p.m. eastern time Monday through Friday.

You'll be in good company.

PARTNERSHIP FOR A DRUG-FREE AMERICA

USER-TO-USER

Since the date can contain more than eight characters, you might expect DOS to issue an error message saying that file 4-07-1988,XXX doesn't exist (because the filename is invalid). However, DOS uses just the first eight characters of the filename when it executes the IF and RE-NAME statements

Michael Trombetta Manhasset, New York

The DATE command displays the current date ond osks for a new date-you press Return to occept the dote shown. "ECHO MORE | DATE" sends a Return to the DATE function without requiring a user keypress. The resulting file READ-DATE BAT will look like this:

Current date is Sun 12-25-1988 Enter new date (mm-dd-yy):

When DOS runs the batch file READ-DATE, it interprets the first line as a re-

quest to run o progrom or batch file called "CURRENT" with "dote is Sun 4-06-1988" os the command line parometers.

 The batch file technique described here is

helpful because it accomplishes most of PUSHDIR's work using

standard DOS commands. Note that if a progrom called CURRENT

COM or CURRENT EXE exists in the some directory as CURRENT BAT, this process won't work.

The first time you use this technique you must creote o file colled DUMMY.XXX in the some directory os the AUTOEXEC BAT file. You must not have ony other files with extension "XXX" in that directory. After the first time, you'll just reuse the

Those of us who develop programs or experiment with novel combinations of TSR progroms tend to reboot frequently. Mr. Trombetto's enhancement is for us. -Neil J. Rubenking

SHARE YOUR SECRETS

previous day's "XXX" file.

Reveal your latest DOS and systems discoveries through User-to-User, and we'll pay you \$50 or more for any submissions we print, plus on extra \$25 if you submit your letter on o disk. If you send a disk, please include a printout. Mail your contributions to User-to-User. PC Magozine. One Park Avenue, New York, NY 10016



for IBM AT To ceder & (409) 822-9490. Include \$3.00 hundling. Back cards accepted

Australian Agent: KEWT

CrystalPrint...

The Smallest, Most Personal Page Printer Has a New First Name

More Personal than Ever

Small Lightweight. East, Quiet. As convenient and affordable as a personal computer. That's the CrystalPrint personal page printer. Now there's another reason to own one. As a result of the consolidation with Data Technology, it's available from Quinte—one of the first and most respected names in the printer industry.

Personal Size

Qume CrystalPrint page printers require 50% less space than the leading laser printers.

And they weigh 30% less. That means

Personal Productivity

Quine CrystalPrint Series II is and CrystalPrint Whis page printers put six pages within arm's reach in a minute. There's no waiting, No ear-shattering noise. No trainsing around the office to a shared printer. Even the paper tray is conveniently from loading to make you more efficient.



Professional Performance

Quine CrystalPrint Series II gives you full HP Laserfet Series IIth emulation and fonts. CrystalPrint WP comes with Ourne/Diablo

Qume

emulation. HP or Epson entulation for presentation graphics and desktop publishing is optional. Other emulation and foot cartridges are available for both models. And both deliver crisp, clear text and graphics — print quality that rivals the most expensive page printers, but at a much lower cost.

Personal Price

Here's the best part. At \$1999* for the Qume CrystalPrint Series II and just \$1299* for

Qume CrystalPrint WP, page printing is now closer to you than ever before.

> Get on a first-name basis with Quine CrystalPrint and let your CrystalPrint dealer show you the most personal page printer since the ballpoint pen.

For the location of the nearest Qurne CrystalPrint dealer, call 1800-223-2479.

Qume.

900 Yosemite Drive, Milpitas, CA 95035

Laserfet Senes II. Epson and Diablo are regimered trademarks of their respective corporations. "Suggested settal price

⁶Quine Corporation 1995



WHOLE EARTH **ELECTRONICS**

THE BEST 286 VALUE DISA!



WHOLE EARTH TURBO 286-20



COMPUTER SYSTEMS

COMPLETE SYSTEM I.2MB Fujitsu drive

- Monographics card . TTL monitor with & swivel
- motherbord) Coprocessor socket

Call for our FREE catalog! Thousands of products at absolute lowest possible prices

- Best prices on 8088, V20, 286, 386 CPU's - Call in your order or use the order form

- · Parallel printer port
 - AT style keyboard 200W power supple
 - · Price includes hard drive conroller by Western Digital
 - 8 Expansion slots FREE FREIGHT

IN CONTINENTAL U.S.A 749.

10 MB XT 40 MB 286... 1499.

40 MR 3R6 2995

COMPLETE SYSTEM!

WE BEAT ANY PRICE ANYWHERE

WHOLE EARTH WANTS YOUR BUSINESS -

CALL US BEFORE YOU BUY! * Some restrictions may apply

WHOLE EARTH COMPUTER SYSTEM

"The Best You Can Buy"

- Technical Support Available Built and Tested in the USA 1 Year Limited Warranty 30 Day Money Back Guarantee
- Licemsed MS-DOS 3.3 Available with System Purchase Lowest Prices on Thousands of Other Goods



 WHOLE EARTH ELECT FREDRY SUBJECT TO COR



Power user

Sorting WordPerfect records by date; entering key symbols as text in Word 4.0; accessing FIND in dBASE III Plus with a single keystroke; linking Clipper programs faster.

A SINGLE-KEY FIND

When Ashton-Tare's developers added the excellent FIND capability to the #Bazpathily to the first with the same letter, F. Muerover, they positioned the less-used FREZE to the left of FIND, so the only way to activate FIND is to Right-Arrow five times and strike further. This must have been decided by a committee rather than by user.

My solution is to change the four offending bytes in dBASE.OVL using DE-BUG. "Find" is changed to "Seck" and can now be accessed with the single keystroke S. Use the following as a script for DEBUG to make the changes in dBASE III Plus, Version 1.1:

E 7A46 53 65 65 6B W

The FIND option is located at a different address in dBASE III Plus 1.0. It can be found with DEBUG's Search command and changed as above by substituting the new address for 7A46.

Peter Giesen Victoria, British Columbia Canada

In fact, you can bring up the Browse menu's FIND with only two keystrokes, by hitting the Left Arrow followed by Enter. Mr. Giesen's single-stroke solution is faster, however.

To patch dBASE.OVL in dBASE III
Plus, Version 1.1, type in the three-line

script above with a pure-ASCII word processor. Be sure to include the spaces between the number pairs. Hit Enter after each line, including the last one. Name the file FIXFIND SCR. Make sure you have a backup of dBASE.OVL. Then with FIX-FIND SCR and dBASE.OVL on the default drive and DEBUG.COM in the DOS path, enter:

DEBUG dBASE.OVL < FIXFIND.SCR Before doing this, though, remember that it violates your dBASE License Agreement and is not supported by Ashton-Tate. —Brad Stark

UPDATING WORD MACROS

The macro feature in Word 4.0 is among the best available, but if you modify your macros repeatedly while debugging them, the process of storing the updated macros can become tedious. Figure 1 presents a "meta-macro" that acts as a tool to speed storage of updated macros.

Before using this meta-macro the first time, create a glossary entry called Macroname. The update macro uses this entry to keep track of the macro name you are updating. To use the meta-macro, first edit the macro you want to update, making sure the text of the macro is a complete paragraph by jusied. Then place the highlight in the macro pumpagh and invoke the update the macro pumpagh and invoke the update of the place of the first pumpagh. When the macro asks you to correct the macro and the place to the place of the

As a point of general interest, note the «keypadifive-k systroke. This creates a beep to draw the user's attention to the message line. Also note the dooble carets (*) after the command to insert the macro mer. Without these carets, if the macro mer. Without these carets, if the macro word will interpret the control-key due to the control-key macro by having two carets, the first of which tells Word to take the scond one litcally), you can tell Word to "type" the control little of the control and the control properties of the control which tells Word to take the scond one little mer. It was a support which tells Word to take the scond one little mer. It was the word which tells Word to take the scond one little with the word which tells when we will work with which we will work with which we will we will

control-key sequence as text.

James C. Beard, M.D.

Seattle, Washington

One other detail of interest is the <Ctrl-Esc><Esc> at the beginning of the macro. The Ctrl-Esc combination at the begin-

<Ctrl-Esc><Esc><Enter><Enter><Left><Esc>imacroname^^<Enter>

<Shift-F1><Shift-F1><keypadfive>*pause Correct the
macro name, then press Return*F9>*F6><Left>
<Esc>cmacroname<Enter>y*set macname=selection*
<F18>CP1>*CBackspace><F18>*Esc>c macname**Enter>y

Figure 1: A macro to simplify storing updated macros in Microsoft Word.

Three ways to build better Turbo Pascal programs...

NEW! POWER

Screen 1/0 manager. Features: ◆ screen painter ◆ virtual screens data validation ◆ context sensitive help unlimited screens ◆ definable keys ◆ & much more!

POWER TOOLS PLUS

Full featured function library. Peatures: ◆ TSR support ◆ direct video access ◆ VGA and EGA support ◆ windows and menus . DOS memory allocation ◆ interrupt service routines ◆ & much more!

ASYNCH

Asynchronous communication manager. Features: ◆ speeds to 19.2K band ♦ XON/XOFF protocol ◆ hardware handshaking ◆ XModem file transfer ◆ 1/0 buffers up to 64K ◆ & much more!

We're Blaise Computing, manufacturers of high quality function libraries designed to reduce the time and technical expertise required for serious applications development All of these packages include Peter Norton's On-

line Instant Access Program, a comprehensive user reference manual with extensive examples, and full sample programs Satisfaction guaranteed or return within 30 days

for a full refund, We have a full line of products for C and Pascal.

For a free brochure or to order call 800-333-8087!

BLAISE COMPUTING INC. CIRCLE 116 ON READER SERVICE CARD

ning of a macro puts you at the first-level menu, no matter where you were in the program when you invoked the macro. Similarly, the combination <Ctrl-Esc> <Esc> puts you in edit mode. One or the

POWER USER

■ The caret tells Word to interpret the following key symbol as text, rather than

as a command.

other of these combinations should be used at the beginning of most macros that can be invoked by control keys.

(A notable exception is cursor control macros. If you've set up a macro to emulate the WordStar diamond-Ctrl-E for up, Ctrl-X for down, Ctrl-D for right, and Ctrl-S for left-you can use these macros within the menus as well as within text, but not if you include the <Ctrl-Esc><Esc> sequence in the macro. -M. David Stone

SORTING FIELDS BY DATE

While attempting a merge sort on a MM/DD/YY field of several merge records. I discovered that the resulting sorted order was incorrect. WordPerfect sorts records containing the dates 3/1/86. 3/31/85, 10/1/97, 10/31/87 into the following order: 10/1/97, 10/31/87, 3/1/86, 3/31/85

To sort the dates properly, start by globally appending a space following the slashes, turning each into "/ ". With the dates now broken into words, define the sort or-

der as shown in Figure 2. Finally, globally delete the appended spaces-that is, find "/ " and replace it with "/"

Dwayne Cargile Gainesville, Florida

The sorted order in Mr. Cargile's example is not actually wrong-it's perfectly cor-

WordPerfect sort the dates more usefully by separating them into three words, then sorting first by year, next by month, and last by day. Do note that the example as shown assumes the dates in question are at the start of each line. If you use this technique on lines that have the date placed differently, you'll have to choose your KEYs appropriately .- Neil J. Rubenking USING COMMANDS AS TEXT

rect if you consider the dates to be just

strings of characters. His method lets

By grouping command macros with text entries in the Word 4.0 glossary, Microsoft has created a potential problem for those who write documentation. Suppose you

always show the Enter key as

<Enter>

in your documentation. In Word 3.11, you could save keystrokes by creating a glossary entry called "ntr" that typed out < Enter> whenever you typed ntr<F3>. Try this in Word 4.0, however, and the macro feature will start a new paragraph for you. That's because Word sees the text "<Enter>" as a macro command (a carriage return), not as text.

The solution? Write a macro that creates the desired symbol but includes a midstream correction. For example, assuming you're in insert mode, try

<Enter<Backspace>r>

With the macro command broken up so that Word 4.0 doesn't recognize it as a command, the program dutifully types out the text.

Frank Giffen Manhattan Beach, California

Although this works, there is actually an easier way. The caret symbol (*) will tell Word to interpret the following key symbol literally, as text, rather than as a command. To show the Enter key as < Enter >. you only need to write the macro as

^<Enter>

NUMERIC, FIELD 2, LINE 1, WORD 3 (YEAR) KEY 1 NUMERIC, FIELD 2, LINE 1, WORD 1 (MONTH) KEY 2 KEY 3 NUMERIC, FIELD 2, LINE 1, WORD 2 (DAY)

Bring to your DTP systems a new style and give your HP series II a second life.



Destiny's low-cost PageStyler adds 100% PostScript™ compatibility to your HP series II without sacrificing vour printer's current capabilities.

With PageStyler from Destiny Technology you can go either way-in style with PageStyler, the PostScript language compatible sub-system, or with HP PCL,™ You choose, from your keyboard to your printer.

Destiny offers full PostScript compatibility from any software package with PostScript drivers, with enough memory to handle full-page graphics, font selection, and image transfers. PageStyler, the only way to go, if you go in style.

COMPATIBLE SOFTWARE -

- Ventura Publisher™

- Harvard Graphics
- PageMaker Tal
- Other software based on WindowsTM WordPerfect 5.0™
 - The Office Publisher™
- Designer ™ MicroSoft Word 4.0™ & Excel™
- Manuscript TM · Destiny has tested these software packages. More software packages will be tested and announced



Destiny Technology Corporation 930 Thompson Place . Sunnyvale, California 94086 Phone: 800-874-5553 • 415-537-9044 (inside CA) FAX: 408-733-0870 TLX: 3729687





All These Functions For \$150.00

Word processing Document tracking Communications Terminal emulation

4 functions in one casy to use program that conserves your learning time, your PC's memory, and your money. Wordmover's state of the art features are based on Computerease Software's experience with the publishing industry since 1983.

Powerful Word Processing

written in assembly language for speed, menus for beginners, command interface for advanced users, built in spell checker, edit up to 9 files at a time. 20 level undelete, search and replace, proportional foir support, macro/script capability, mail merge.

Integrated Communications dialong directory, translation tables, XMODEM, unartended file receive, customizable terminal emulation for VT 100, 3101 erc.

Document Tracking Wordmover gives you the cross referencing of a database without the setup and learning hassles. Cuscomizable "header" templates for tracking by addressee, subject, document number, etc.

Selective directories by category of file. Easy to use

Thorial documentation keyed to progressive help screens for quick incremental learning. Pop down menus and key ptompes. Customizable keyboard, commands, messages & color.

SOFTWARE LAST

P.O. Box 170 Warren, R.I. 02885 (401) 245*1537 (401) 245*1523 CIRCLE 130 ON READER SERVICE CARD ■ POWER USER

 The Microsoft linkers are faster than Clipper's PLINK86, especially with a large RAMdisk.

Be aware that the caret command only applies to the symbol that immediately follows it, so that the macro

^^<Enter>

will type a caret followed by a carriage return. If you want to type a caret followed by the text "<Enter>," the macro would instead be

^^^<Enter>

The first caret tells Word to treat the next caret as text. The third caret tells Word to treat the Enter command as text. —M. David Stone

PUTTING TABS IN WP HEADERS
To make columns line up when using proportional-spaced fonts, you must use tabs rather than a series of spaces. WordPerfect

won't let you enter tabs in a header directly, but I've found a way around this.

1. While creating or editing the header, switch to the other document with Shift-F3

and enter as many tabs as you need.

2. Delete the tabs you just entered, then switch back to the original document.

3. At the location in the header where

you need the tabs, hit <FI>I to restore the deleted ones.

The new tab codes will recognize the latest tabs set before the header and thus will line up labels in the header with the

columns of data. The same method works with footers, endnotes, and footnotes. Collier N. Smith Longmont, Colorado

The problem with spaces in a proportional font is simply that not all characters are the same size. Ten spaces are wider than ten i characters but narrower than ten W characters. You may think you can enter tobs in a header directly, but actually to

just inserts an appropriate number of spaces. (Try it—you'll see.) You need to use real tabs to line things up to columns if you're printing in a proportional font, and if you have multiple pages of columnar data, this fip will let you put column labels at the top of each page.

Neil J. Rubenking

SHORTENING LINK TIMES

One disadvantage of Clipper is the time it takes to compile and link during testing. Clipper's manual says you can use the DOS linker as long as you are not also using overlays and that it is "somewhat faster" than PLINKS. To see if improvements could be made, I compiled and linked IoEK of source code on a Compact 266 (8MIz), with these surprising results:

Linker	Disk	k RAM	
PLINK86, Version 2.24	1:55	1:27	
Microsoft linker, 2.40	1:01	0:34	
Microsoft linker, 3.60	0:54	0:25	
Microsoft linker, 3.61	0:34	0:19	

If you compile and link many times a day, the savings really add up. Luke Miller

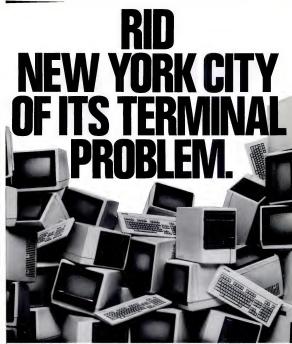
Luke Miller Baltimore, Maryland

The Microsoft linkers are indeed faster than PLINK86, especially § you have the luxury of a large RAMdisk. Version 2.4 is the linker provided with DOS 3.2; DOS 3.3 comes with linker 3.60. Microsoft linkers starting with 3.60 support overlays.

If you really want to rip, try using TLINK (included with Borland's Turbo C). Mr. Miller's program above links in just 14 seconds on disk and 6 seconds in RAM! Too bad it doesn't support overlays.—Brad Stark

SHARE YOUR POWER

Tell fellow users about your latest technical tips for hardware and software applications (other than spreadsheets, networks, languages, or DOS) through Power User, and we'll pay you \$50 or more for your trouble, plus are extra \$25 ff you submit your letter on a disk. If you send a disk, please include a printout. Mail your contributions to Power User, PC Magazine, One Park Avenue, New York, NY 10016. 28



The City of New York needs to clear out its complete stock of valuable used computer equipment. Take advantage of this opportunity to save on systems, terminals, keyboards, parts and more. Bids will be accented for

the entire inventory. Contact Jim Scanlon at (212) 669-8548 to obtain a listing and to arrange an appointment EDWARD I. KOCH, MAYOR Haddey W. Gold, Commissioner

Hadley W. Gold, Commissione Dept. of General Services

for viewing.

Intelligent Micro Systems



IMS-286/12MHz Base System .

80286 processor running

at 12MHz, zero wait state, switch-selectable to 6MHz

 1MB RAM · 1.2MB diskette drive

· Dual diskette drive/fixed disk controller

· Enhanced, 101-key keyboard · 200-watt power supply

· Illustrated installation and

operations manual Clock/calendar with

battery backup

Base System with Monographic Card and Monitor \$1255

With 40MB Seagate (30ms) With 70MB MiniScribe (28ms) Upgrade to EGA by adding \$320 to monographics system prices!

I/O Boards For AT *: Serial and parallel ports . . . For PC/XT 6: Serial.

80287-10 math

1200 Baud Internal Modem With communications



Diskette Drive Math Coprocessors 360KB or 1.2MB diskette 80287-8 math drive to enhance your \$349

360KB

1.2MB

Multifunction Cards For AT: 0KB expandable to 1.5MB, serial and

\$1695

parallel ports For PC/XT: 384KB; ... \$110 serial, parallel, game ports, clock/calendar with battery backup .\$199

Mice Logitech Serial Mouse: programmable, three

buttons Microsoft Bus Mouse: mechanical mouse includes bus interface \$119

IMS-286/10MHz

Base System 80286 processor

running at 10MHz, switch-selectable to · Enhanced, 101-key 6MHz

 512KB RAM 1.2MB diskette drive

 Dual diskette drive/ fixed disk controller

keyboard · Illustrated installation and operations manual

 Clock/calendar with battery backup

\$1545

\$1835

· 200-watt power supply

Base System with Monographic Card and Monitor

· With 40MB Seagate (30ms) · With 70MB MiniScribe (28ms)

Upgrade to EGA by adding \$320 to monographics

system prices!

The Intelligent Solution



IMS-88/10MHz Base System .

 Diskette drive controller Keyboard

150-watt power supply

· Illustrated installation and 360KB diskette drive operations manual

Upgrade to EGA by adding \$320 to monographics system prices!

Base System with Monographic Card and Monitor

 With 20MB MiniScribe (65ms) . With 40MB MiniScribe (61ms) SOFTWARE SPECIAL * * * *

8088 processor running at

10MHz, switchable to

4.77MHz

640KB RAM



Convenient Software for Project Scheduling and Reporting Microsoft® Project by Microsoft is the perfect tool for time management, offering you a vast selection

reporting features. Keeps you aware of deadlines and current project status. \$330

T.W. 'Dillo isn't one to try to tug the patriotic heartstris of his customers too often. Like most true citizens, T.W. figures you don't have to paint a flag on your armorplated body in order to prove you bleed red, white, and blue. But - darn it - there's just something so ... American ... about buying from Intelligent Micro Systems.

"Every morning at Armadillo Elementary, my First Grade teacher Mrs. L.G. Dillo drilled us in the Declaration of Economic Independence," T.W. recalls wistfully. "We all learned the basic rights - Life, Liberty, and the Pursuit of a Quality, Low-Cost Personal Computer,"

Using these rights as a guide, T.W. fulfills his civic duties with Intelligent Micro Systems' impressive line of IBM compatible personal computers. The IMS-88 offers an inexpensive entry system, while the IMS-286 models provide supercharged performance at reasonable prices. "There's a system for every citizen," T.W. says proudly. "Now, that's what I call democracy!

To Order Call Toll-Free:

800-777-7757

For Customer Support: 512-250-8794 Mon.-Fri. 8am-7pm CST

Artwork by Todd Winte



CIRCLE 382 ON READER SERVICE CARD





merican Semiconductor '

YOU OWN IT!!

MOOEL -5303

• Salactable 6.77, 8.6 101810

hralisole • Bios • 8088-2 CPU One 388K Floggy Drive • Muhi I/C

Authorny Controller, Clock/Calanda

Reach your full potential with America's first choice, American Semiconductor

Now, with over a billion in financing available, it's easy to own the computer system that you want and need



MODEL /\$301 .E.D.E. Selectable 4 77, 8 6 105/042 Selectable 4.77, 4.6 (65/11) Processing Speed + 9-15MB RAM Available + Bios + One 360K Floody Onive + Floody Controller w/Capte Arsilable • Bios • 16 th 8066-2 CPU • One 366K Floppy Drive . Multi I/O I wiFloogy Controlle OUR PRICE 1599

Clock/Calendar Parallel, Senal & Game Port • Eight Expansion State

16M8 Hard Drive (w/ Controller **OUR PRICE 1688** OUR PRICE 1978 OFF 25,000 CUSTON

. 12MHz Clock Speed + 0-16MB RAM Available • Bics • Irrel 80298 Micropropessor • 1,2MB

OUR PRICE *1818 OUR PRICE 1743

NO MONEY DOWN!

Even if you have a computer We'll sell you add-ons from our TOP QUALITY products, and FINANCE them too! OUR PRICE *955.-*2995. *Available on XT Mother Boards

IAMS MONTORS ARE ADDITIONAL SUNGE PROTECTOR/POWER DISTRIBUTION CENTERS ARE OPTIONAL AND AVAILABLE FOR DISV SORP

1-800-825-SAVE

• B 6 16MHz Processing Speed

Metheral Floory Drive - Mutt VO

w/Floppy Controller Clock/Calenda Parallel, Serial 8 Game Fort) • One

20MB Hard Drive (wController)

• TurbofNormal Mode Ermer

OUR PRICE *1171

OFFICES NOW OPEN: TAMPA-MI.

MODEL /8402

• 80196 Compatible (7.16MHz) • FIOM

22X5N (BIOS. etc.) • RAM 256XB standard sepandable to 646XB • 3.5" 729 XB FOO x 1 • Optional 2nd 3.5" FOO or 29MB HOO • Supertwel Christia Deplay • Capacity 80

characters x 24 knes (840 x 200 pixels) + 0°980° hit angle adjustment + 78/98-key step

sculptured keyboard with integrated numeric keybad • Paralkel (Centronics) port x 1 . External 514 " FOO unit If a 1 . Stor to

Stot for Modern Card or SIQ card x 1
 121/y '(N) x 3" (N) x 13% '(D) • Approx
10 los. • Land battery (7 hrs. operation)

MNOVELL

MODEL 15305 CTA

MODEL +5304 8.6 19MF; Clock Speed
 9.16MB RAM Available * Box
 16 Br 8088-2 CPU * Two 3608 A S & Wilder Dropper • 16 Bit 8088-2 CPU • Teo 360 Half Height Floory Drives • Multi IC (wFloppy Controller, Clock/Calendar Parollel, Serial & Game Port) 38M8 Hard Drive (wController)
 Turbofformal Mode Ether Enhanced Keyboard

OUR PRICE 1298

Software or Hardware between • Eight Expension Sides • PC/X OUR PRICE \$1799

Flight Simulator

MODEL /5701 • 16-20MHz From

16MHz 80287 Co-processor Societ

• Standard 32 Bit • 0-16 RAM Available Connectors for Affsching up to MMB of Memory + 1.2WB Histi Height Floppy Drive

OUR PRICE 12478

60 RACE TRACK RD., TAMPA, FL 23E36, (812) 886-8621

LANGUAGES



Disabling the Print Screen function and creating colorful screens in Turbo Pascal; a unique BASIC menu; and manipulating the master environment in C.

MASTER ENVIRONMENT CHANGES Inspired by some of your recent issues on

the DOS environment. I wrote PATH-SUB.C, shown in Figure 1, to make substitutions to any variable in the Master Environment Block, not the copy of the environment that DOS makes for each program. It can be used more effectively than the DOS SET command when you wish to

like substituting directory entries in your PATH variable. The syntax for PATHSUB is

PATHSUB [/var] pattern substitute

where "/var" is the name of the variable to alter, "pattern" is a substring in that variable's string, and "substitute" is the substitute string. If "var" is omitted, the default variable is PATH. If specified, "var" is converted to uppercase, but both "pat-

There are two characters that have special values when used as "pattern". If the caret (*) is used, the string "substitute" will be placed at the beginning of the variable (immediately after the "="); if "pattern" is "\$" then "substitute" will be placed at the end of the environment.

If you wish to delete something from an environment variable, overspecify the "pattern" and make the replacement match only what is to remain; for example,

alter only part of an environment entry; | tern" and "substitute" are case sensitive. PATHSUB ; C:\UTILS; /-- Parmsus - substitute strings in unvironment variables (default: PATM) Vesco: Patristis [/ver] pet sub paramore will substitute the let occurrance of 'pat' in the environment variable 'var' with the replacement string 'sub'. Both 'pat' and 'sub are required. The default sevironment variable is "Parm". #define Lestchar(string) string(strlen(string)-1) If you wish to delete something from the path and make the replacement match the entra s.q. PATERUS (CI\UTILE) (nclude <atdic.b> nelude <atdib.b> nelude catdib.b> nelude category.b> ne.b> arge; His ober cmdpeth[256]; His ober peth[256]; His ober terget[168] = { "PATH=" };

gure 1: The source code listing for PATHSUB.C., a utility to manipulate the master environment.

■ LANGUAGES

would remove ";C:\UTILS" from the environment variable.

The PATHSUB program works by finding the memory control block for the first copy of COMMAND.COM that is in memory and then working up through the memory control block chain until a memory control block "owned" by COM-MAND.COM is found. Once this is

achieved, then that block is searched for | the appropriate environment variable. If the variable is found by PATHSUB and there is enough room in the memory control block for the substitution, the memory control block is copied to a local buffer,

modified, and then written back.

Richard Hartman Mountain View, California | program uses a number of data structures

Sometimes, compiler library functions like getens() and putens() aren't appropriate tools for the job that needs to be done since they make alterations only to a copy of the environment, PATHSUB, on the other hand, uses some anirky techniques to modify the master environment from which all other copies are made. In addition, this

(Figure I continues)

```
miss if ('estrompiergy|firsterg|, "$")) /* Append to tail of path */
aprintf(codpath, "%ata",path.argv|firste(pt)])
| ** Substitute into path */
** Substitute into path */
uneigned de:
                                                                                                                                           else
firsterests
                                                                                                                                                    stropy(codpath,path)
/* If siturnets savironment war specified */
if [arge[firstore][8] -- '/')
                                                                                                                                                     i = struck(codpath+striam(terget), srgv(firstarg),
argu(firstarg-1), 1);
                                                                                                                                                     15(1 -- 8)
        strepy(target, argulfirstarge+)+|); /* copy from arg (after '/'; */
strest(target, '*'); /* append an '*' */
streat(target); /* convert to uncercase */
                                                                                                                                                            target|etrien(target)-1] = NULL;

Eprint(redeer,

NULL;

Eprint(redeer,

NULL;

Epril (redeer), target);

especificators), target);

esit(2):
if (arge < firstarg=2)
        fprintf(atderr, *\nrarmsum: Usage - Parmsum [/war] pat sub^;;
exit(4);
                                                                                                                                             /* manage gld entry FROM DER COPY of environment block */
delets(men_block, ppde);
cheb . Lbeb . geaal.
                                                                                                                                              /* make mas astry in OSE COPY of sawiresment block. If the addition */
/* firs, THEM copy entire block beck where it came from */
if:sppado(sem_block, cmdpath, ctrl_block.lengtb=16);
while (_opep != _speps
        opep * speps
                                                                                                                                                     sovedstands, consigned; new block, men eng, 6, ctrl block.length=16);
        _opap * _rpap: /* up another layer */
/* get "root" PaP segment */
sovedate(_opap, $PSP_OFF, ds, (cnaigned)&_rpap, 2):
                                                                                                                                             /* if it did not get successfully sdded, just leave "/
Sprintfystders,
"Fattering not second assistances apare -- assistances unchanged(n*);
        /* get the memory control block from the root PSP */
aeq * opap; /* start with the PSP segment */
meq * opap = 1; /* and back up by the sagment */
etri meg - cpep;
etri meg - cpep - 1;
/* copy it to where we can use it */
novedstat etc. seg. 8, ds. (unsigned)&ctrl_block, sireof(ctrl_block));
                                                                                                                                                         this routine will substitute up to "mus" occurence of the pattern "pat' in the strip" a" with the replacement "sub". The sector number of substitutions parformed in returned. If "mus" is -i, then all occuratones of "pat' are chapped.
    . . . .
       int idx, i, ii, count, off; ther news[163];
        done = (ctrl_block.type (= 'W');
                                                                                                                                             fer( count = mff = 0; 1902; count++)
       If(1600a) /* seamine mem block, if not too big */
If(ctrl block.isogtb < MARLES)
                                                                                                                                                     /* we only need to check string past and of lest substitution */
if a string(selff), put);
/ if an extraction for the limit and limit specified,
/ if (count >= num ) 46 (cum (* -1)) || (ids == -1))
rature economic;
                         /* Load the block */
               /* Load the Siock "/
nevedsts [ nem seq. #, ds. [unsigned]sum block,
ctri_block.iength=18;
                        /* find the first occurance of our pattern in the block */
/* if it does not appear, result will be -1 */
                                                                                                                                             /* ids = off is now the offset to the beginning of pet in a */
/* copy from up to pattern in string to local befor */
for (i = off; 1 < lea-off; 1+) /* nely need to op from lest obg */
news[1] = ||1|
                        /* asarch the block */
for(zpon * off = 0; :done as off := -(; ppcn++)
                                                                                                                                                     /* ad the substitution */
for (ii * 0; ii < strien;sub;; ii++;
news;:*ii] * sub(ii);
                                        /* finish copying the rest of the string */
idswoff * strian(sub); /* where seed end in dest */
is self * strian(pat); /* where seed end in dest */
/* remarker for rest during
                                         ppost-off;
                                         fpos**eff;
/* sid if velid *-
if(ppos ** 0 || nem_block(ppos-1, ** fills)
                                                                                                                                                      neve[ii++] = s[l++];
neve[ii] = SULL;
strepy(a, neve);
                                                 door - THIR: /* set to break main loop *. break; /* get out of for loop */
                                                                                                                                              ratura count: /* ratura number of suke done *:
) /* end: look through this memory block */
) /* end: look through all memory blocks */
if:(ppee -- -1) [] ortri block.type :- 'W'))
      Lastobar(Largett);

Sprint (Largett);

Sprint (Largett);

Largett);

sait(3);
                                                                                                                                          t strids(e,p)
                                                                                                                                             cher *p2:
                                                                                                                                             if( p2 - stretr(s.p))
retorn p2-a;
retorn -1;
                                                                                                                                                                                                                /* if p found in s, */
/* reture offset into a */
/* else return -1 */
atropy(path, seem_block(ppos)); /* copy our current "Parm" string "/
uneigned_abowde()
```

struct samps asgraça

At Last, Someone Got It Right... The World's First Perfect Keyboard!

Northgate Omni Key/102" FOR XT. AT: 386 TYPE SYSTEMS

Read what the experts sav...

"...12 function keys on the left where God intended them...revolutionary and much needed...Better than any replacement keyboard...duplicates the responsiveness and tactile feedback of the original IBM keyboard...A viable alternative to IBM®'s model...durable, well-designed, sensible and has just the right feel.

Gary Ray, PC Week.

"I was surprised to discover how {Northgates} keyboard incres productivity. My ears can tell when my fingers have mistyped, and when I'm flying across the keys, my fingers get the

kind of feedback they evidently need."

Kelth Ferrell, Compute Magazine. <u>Vping on the (Northgate)</u> is more comfortable an on any of the replacements I've tried. Jonathan Matzkin, PC Magazine

PALIS ON THE LEFT I...
Most people braned high-acid
typing on boards with the P lings at the
first That where they're mad convenient
and easied for the lift hand to use them. But
hands stay is place as typing whost inches
and occurrent increase and production nours.

Northaate Designed Omni Key/102 In

Response To Countless Users Who Demand Better Layout, Better Touch And Positive Entry Feel!

Features You'll Find Only in the Omni Key/102

patible with the IBM® enhanced keyboar ding a Sys Rq. key for mainframe access. CTRL key is where you expect to find it, too, next to letter A. CapeLock key is next to space but.

 The E2 Pully Programmable Function Keyn are positioned on the left where everyone told us they belong for increased typing efficiency. #9 Curser and screen control lays on separate pad Four separate cursor arrow leys. Exchanive Northgate Click/Thetile touch using Japanese made ALPS realed electro-mechanical key switches rated for virtually a lifetime of use. ■ Full Numeric Keypad AND WE'VE EVEN ADDED AN (=) KEY FOR FULL REDUNDANCY WITH TOP NUMERIC BOW

Three-Year UNCONDITIONAL WARRANTS: Spread sheet users lose this feature Arpthing breaks, we fix or replace free. 12 window pencil-in strip so you can customi Function Key notes to yourself.

 LED light panel for CapaLock, NumLock and Scroll Lock (IBM doesn't have lights) Built to last with full metal base (ma Built to last with full metal base (many layboards are all plastic). Omni Key' 102 has a solid, 6.5 lb. "sit down on your desk to stay feel." ESC, CTRL, SHIPT, ALT loys are color coded Red, Green, Blue for WordPerfect[®] users.
 Vertical templates fit, tool

Enter Key in jumbo staed, L-shaped. Backspace key is double-width. Both Shift keys are overstaed for error-free operation.

CTRL, SHIFT, ALT Keys are aligned on left side. ESC lery is where it belongs, rest to No. I on the

Now! PS/2® Compatible

Yes, Omni Key can be used with IBM PS/2 models 30, 50, 60, 80 ONLY \$25.00 additional

New Stim-Line ergonomic profile

■ 100% Novell ELS Compatible

Pop-up back legs adjust typing angle for reastment comfort

== Proved accessed 1 800-453-1400 Order yours today, Hurry, Supplies may be Limited. PUTER SYSTEMS . 13605 Inquenel Park Blvd. Sule 110 . Plymouth, MN SI

is, ang my cime key roz arbents I and for 19 days and il I wish, may return it fo fund. I agree to pay for freight both ways.

Own Key 10 OT 101

CTM TOTAL OF ORDER

PS/2 Model (Add for es.) Peace charge to my T Was T M Signature of Condivider

TRY IT FOR 10 DAYS

-RETURN FOR REFUND IF NOT 100% PLEASED

(Your only risk is cost of shapping

iot memorob(mem, etr, len) cher *mem, *etr; int len;

100 1, 5: len -- strlengetry;

that DOS programmers should be familiar with: the Program Segment Prefix (PSP). the Memory Control Block (MCB), and the environment itself.

But there are a number of caveats to be aware of when altering the DOS enviroument (see "A User's Guide to the DOS Euvironment" and "Expanding the DOS Environment," PC Lab Notes, March 31 and April 14, 1987). Proper operation of PATHSUB depends on some values stored in the PSP of programs in memory. If some other function or program has modified

the PSP (like a Critical Error Handler). PATHSUB may not function correctly.

However, PATHSUB is an excellent tool for making batch files more intelligent, and the technique demonstrated in it can be used in another program when the environment must be modified. While I touched up the stridx() and memsrch() functions to make them more general, further modifications might include using far pointers used to walk the memory control blocks and modify the environment.

-Richard Hale Shaw

/* reed the segment requeters */

COMPILED BASIC

/* get length of entry being deleted */
size = stylen(ablock(index())*); /* whift the remaining block down or top of string being deleted */
for[index += mins; index <= end; index++)
block[index-mins] * block[index];

BOUNCING-BALLMENUS

One of the things I enjoy most is writing games in BASIC-including games that children can enjoy. I have created a "bouncing-ball" menu (Figure 2) that is easy enough for even the youngest child to understand. As the ball bounces from choice to choice, simply press Enter when it is beside the choice that you want.

> Sally Ann Zegarelli Long Branch, New Jersey

```
eppend(block, string, mexica)
char *block, *string;
unniqued lot maximum;
                                                                                                            /* for each character of nea to
            for( j = #; j <= len; j++)
                                                                                                                                                                                                                 int end, eige, in
                        for( i = B ; |mem(j+i) == str(i)) 66 str(i); i=+); |f(i=trii)] /= if sted of string =/ return the index =/ /= return the index =/
                                                                                                                                                                                                                    /* find storting point for etring to be edded */
for( end = 1; block[end-1] | block[end]; end**);
                                                                                                                                                                                                                   size = etrlem(etring) + 2; /* measure length of new string + 2 NULLe */
                                                                                                                                                                                                                    /* check to see where last (proposed) byte falls in block */
if;(sed**isa) > maxles)
rstern(FALES)
                                                                                                                                                                                                                    for( i = 0; string(i); block[end+s] = string(i++));

block[end+s] = Wills; with a will a will
                bleck, Indexs
cher *block:
fut index;
         ter sien, end-
                                                                                                                                                                                                                   retero TRAN
          /* find end of covironment (2nd of 2 NULLs ic e row) */
for( and = 1; block(and-1) | | block(and); and++);
                                                                                                                                                                                                                                                                                                                                                                      (Figure 1 ends)
 DIM OPTS(10) : LIMIT-7
                                                                                                                                                                                                        GOSUB CROICES
                                                                                                                                                                                                                                                                                                 'display menu choices
 FOR I - 1 TO LINIT
                                                                                                                                                                                                        LOOP. IT:
                                                                                                                                                                                                                   P.IT: 'movee circle if no key wee present

RS = INKEYS : IF SPOT > LIMIT THER SPOT = 1
            READ OFTS(1)
                                                                                        'exhetitute your own titles here
                                                                                                                                                                                                                          KS = " THEN
GOSUB DISPLAY.SPOT
 MEXT
                                                                                                                                                                                                                    1F K5 =
 DATA "BINGO", "REK", "MASTERRIRD", "BOLO", "POP TRE BALLOOMS"
DATA "LOTTERY BURBERS", "EXIT TO DOS"
                                                                                                                                                                                                                            OGD.SFOT - BFO
                                                                                                                                                                                                                          SPUT - SPOT + 1
                                                                                          TGA histon server
 VIEW (0,0) - (639,349), 0
WINDOW BCHESM (1,1) - (01,26)
                                                                                        'necessery mapping
'nore necessery mapping
                                                                                                                                                                                                                    IF ARCIES) <> 13 THEN BEEF + GOTO LOOP. IT
 CIRCLE (24.4, 8.5), 9, 7
PAINT (24.4, 8.5), 2, 7
COLOR 7
                                                                                          'drew the circles
'change colors if you like
                                                                                                                                                                                                        DIBPLAY, BPOP.
 CINCLE (54, 13-5), 25,
PAINT (56, 13.5), 4, 7
CINCLE (17, 18), 15, 7
                                                                                                                                                                                                                   X + V + BPOT + 2 : X = X +.5 : T + V + OLD.SPOT + 2 : Y = T +.5
CINCLE (R, X), 2, 7
                                                                                                                                                                                                                   PAINT (R, X), 14, 7
CINCLE (N, Y), 2, 4
PAINT (R, T), 4, 4
                                                                                                                                                                                                                                                                                                                      'make the poving circle
 PAINT (17, 10), 1,
 TOTATE 7 18 | BRIDE 5
                                                                                                                                                                                                                   VI - TIMEN
 LOCATE 9,19 : PRINT - MAIN HERU -
LOCATE 9,15 : PRINT -
LOCATE 13,10 : PRINT -
                                                                                                                                                                                                                    WHILE TIRES < XI +.45 | WEND
                                                                                                                                                                                                                                                                                                                     'delay time for bouncing bell
                                                                                                                                                                                                                   RETURN
 LOCATE 14,10 : PRINT
                                    PRINT . ENTER WHEN
                                                                                                                                                                                                                   CLS
17 OCD.SPOT = 1 TESN CHAIN "BINOO" 'My game programs - they ell
18 OCD.SMOT = 2 TESN CHAIN "REXT ' end with CHAIN "MEMBU" to
19 OCD.SMOT = 3 TESN CHAIN "MONIBO" return to this program
18 OCD.SMOT = 4 THEN CHAIN "MONIBO" return to this program
19 OCD.SMOT = 5 TESN CHAIN "FOOT
 LOCATE 16,10 : PRINT *
                                    : PRINT . THE
                                                                                                              'finish this line below
 LOCATE 19,10 : PRINT -
LOCATE 19,10 : PRINT -
LOCATE 20,10 : PRINT -
LOCATE 25,10 : PRINT * DESIDE THE
LOCATE 21,10 : PRINT * CHOICE YOU
LOCATE 21,10 : PRINT * NANT
LOCATE 22,10 : PRINT *
                                                                                                                                                                                                                   IF OLD.SPOT = 5 THEN CHAIN "LOTTERY"
IF OLD.SPOT = 7 THEN CHAIN "LOTTERY"
 CIRCLE(16.5, 17.5), 2, 7
                                                                                          'this prints the ball
 PAINT(16, 17), 14, 7
                                                                                                                                                                                                                   FOR I - 1 TO LIKE
                                                                                                                                                                                                                             FRIST " OPT$[1] SPC(17 - LEN(OPT$(1)))
                                                                                          'if you have long menu sterm you 'en decreese R by a smidgen
```

Figure 2; A "bouncing-ball" menu meant for use in games.

'initialization stuff

STOT # 1 : OLD SPOT # LIMIT

RETURN



Seconds Never Looked So Good!

ttract potential customers, distributors, and vendors with our tastefully designed reprints. Revitalize your article with front page coverage from one of the world's leading computer magazines.

Ziff-Davis reprints are concisely reformatted on 80 pound coated paper and printed from full

color to black and white.*

To find out how you can have your article reprinted, call or write today.

Jennifer Locke-Reprints Manager, Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016, (212) 503-5447.



"Great Fantasy Football requires skill, daring, athletic brilliance . . .

... and access to a computer."

Now, the fascinating crazes sweeping the nation—

Fintings Sports — is more fun than everl You form your own league with
up to 15 other people. Then you draft, buy and sell talent ... pick starters
for each game ... and win based on the performance of real pluguer.

Computerized Pantasy Sports makes it easy to organize scats, calculate
which will be a support of the computer of the property of t

Everything is complete in the Computerized Fantasy Sports package — easy-to-use software (with access to a PC*, it's a slam-dunk), easy-to-read manual with set-pl-y-step instructions, and a complete sample league. Built-in flexibility lets you make your league as simple or sophisticated as you like.

Order now! [If you own the package, you can demand they make you commissioner of the league.]

With Visa or MasterCard, Call Toll-Free: 1-800 537-9228
Or, send \$89.95 for the Multi-Sports Package; \$49.95 for

Or, send \$89.95 for the Multi-Sports Package; \$49.95 for the Football Package to: (specify 5%" or 3%" dist

Dept. PCA, 4569 Mission Gorge Place, Suite B, San Diego, CA 92120 4619; 282-8186
With an EMPC PSI or computation.

CIRCLE 727 ON READER SERVICE CARD

Of Course You're Excited!
But we recommend you distribute
Reach your highers marketing potential

Of Course You're Excited!

But we recommend you distribute

But we recommend you distribute

But we recommend you distribute

Reach you highest marketing potential
with IEEE Davis respirate

Contact p feasible teles—Represent manages

Reach No Willow, (121) 553-5447.

Now York, NY 10206, (212) 553-5447.

PRODUCTIVITY

LANGUAGES

This is cute, though it is suitable only for use with an EGA display. To adjust the speed of the bouncing ball, change the .45 used in the While/Wend loop to another value. Then, replace the titles (and Chain statements) with your own. — Ethan Winer

TURBO PASCAL

DISARLING PRINT SCREEN

It's easy to simulate pressing the PrtSc (Print Screen) key in Turbo Pascal—you just call the PrtSc interrupt. The quickes way to do that is "INLINE(SCD)SO);" If you prefer, you can use the INTR procedure. Declare a registers variable as described in the Turbo Pascal manual's description of INTR and use the line

INTR(5, registers);

But, what if you want to prevent the user from activating PrISc? You can do that with Turbo Pascal, too. DOS uses a flag in low memory to show that the PrISc interrupt is active. That keeps you from accidentally calling it again before it's fin-

It's easy to simulate pressing the PrtSc key in Turbo Pascal—you just call the PrtSc interrupt.

ished. If you set that flag to say that screen printing is happening, the PriSc key will do nothing. The effect of setting this flag is permanent until you restore it, so you can use the example program in Figure 3 to disable the PriSc key during any program.—Neil J. Rubenking

SETTING COLOR SCREENS

Using Turbo Pascal's standard WriteLn in Version 3.0 to set up color screens can be difficult. Procedure PrtChar (Figure 4) makes it easy. PrtChar replaces Turbo's default console output routine and allows for easy manipulation of screen colors. PrtChar uses the tilde character (*) to begin a color command. A color command consists of a "... the bex character for the

```
(SM: C-)
(SM
```

Figure 3: A program to disable or enable the PrtSc key.

```
HexCh : STRING[16] = '0123456789ABCDEF';
  OnColor : Byte = 0;
VAR
  OldConOut : Integer;
  N1, N2
                : Byte;
  PROCEDURE PrtChar(CH : Char);
  VAR N : Byte;
  REGIN
    CASE OnColor OF
       # : IF CH = '"' THEN OnColor := 1
             ELSE
                INLINE
                  %89/$EC/ (MOV SP.BP ) (UNdo what Turbo did at )

$5D/ {POP BP } (this procedure's start.)

{...end JUMP to the regular ConOut }

$FF/$26/> Oldcomout (JMP MEAR [>oldcomout])
       1 : BEGIN
                N := Pos(UpCase(CH), NexCh);
                IF N > 0 THEN TextBackground(N-1);
IF N > 0 THEN OnColor := 3 (blinking)
                ELSE OnColor := 2:
             END:
       2 : BEGIN
                N := Pos(UpCase(CH), Nexch);
                IF N > 0 THEN TextColor(N-1);
OnColor := 0;
             END.
       3 : BEGIN
                N := Pos(UpCase(CN), NexCh);
IF N > 8 THEN TextColor(N-1+Blink);
                onColor := #;
            END:
    ENDI
  END:
REGIN
  oldConOut := ConOutPtr;
  ConoutPtr := Ofs(PrtChar);
  clrscr
  WriteLn('"1EThe New "4Eand"1E Improved "31Writeln"1E!!!!');
  WriteLn('Norks with numbers too! PI is '78', Pi:1:11);
WriteLn('%) CLOCK CHART:');
  FOR N1 := 1 TO 16 DO
     BEGIN
       FOR H2 := 1 TO 16 DO
Write('"', HexCh[N1], HexCh[N2], NexCh[N1], NexCh[N2],' ');
       WriteLn;
    END;
END.
```

Figure 4: Modified console output that interprets "color commands."

ONLY IBC
GIVES YOU

3 YEAR
WARRANTIES ON
ALL AT COMPUTER
REPLACEMENT
BATTERIES.

Backed by one of the largest manufacturers.

Lasts 45% longer than other AT replacement

batteries.

Manufactured in the U.S.A.

Fast delivery and availability are ensured.



TO ORDER, CALL TOLL-FREE: 800/654-3790 (outside California) 800/225-9359

(outside California) 800/225-9359 (in California)

International Battery Corporation 16735 Satiopy Street, Suite 111 Van Nuys, CA 91406 FAX: R18/781-7804

YOUR DNLY SOURCE FOR ALL
COMPUTER REPLACEMENT
BATTERIES.

CIRCLE 198 ON READER SERVICE CARD

■ COPY PROTECTION

RUN YOUR PROGRAM ON ANY HARD DISK

UNLOCK Masterkey Removes Copy Protection from 180 PC Programs

The new UNlock MasterKey 'copying' disk by Transee and best selling UNlock Album De allow you to quickly and easily make unprotected DOS backup copies of more than 180 popular original PC programs.

Your original disk is unchanged and the unprotected hackup copies perform exactly the same as the original, as do copies of these copies.

UNlock copies run on any hard disk, including Bernoulli Boxes. No original key disk is required in Drive A. You can also run on a RAM disk and conveniently copy DOS 5 1/4" programs to 3 1/2 diskettes.

Take protection off programs not listed by using generic routines.

New UNlock MasterKey is TranSec's most comprehensive copy protection removal program. It unlocks all the programs in

TranSec's Albums A+, B+ and D+...and more than an additional 130 programs. It is intended for the user who wants the best and most comprehensive copy-busting program available.

Master Key has the ability to break more than 180 specific menu listed programs. In addition you can take protection off programs not listed in the menus by using generic routines for the PROlock protected programs.

With UNlock MisterKey an analyzer will tell you if the disk is protected by either PROlock or SUPERlock, so that you can simply apply the proper UNlock liberating routine. Even many programs using hardware pro-

tection schemes can be unlocked.
While other copiers will make copies of some programs, mly UNlock removes copy protection.
Backups can't require tedious uninstalls, and reorganizing your hard disk doesn't result in your software calling you a thief. To order call 1-800-423-0772.

UNLOCK MasterKey Not \$159.95
MeeterKey unlocks the programs in Albums "A" Plan and TiP Plan and those below:

Aldergraf (2.2) - Autocad Etn & Wtn (2.5x) - Bancetar - Basic-2C Runtime Package (2.00.04 8 12/12/95) - Balance of Power '65 - Cadkey (2 11.01, 3 01) - Cadvance (1.10, 1.20 1.30) - Computer Aided Planning (CAP) 12/15/95 - Cadvance DXF Translator - CAP (3 00) smaster 2000 (85) - Courtracting System (22) - CP2A (5.8) - DAM Busters (86) - Data Highway Diagnostics (1.3) - Database Manager II (2.0, 2.02) - Diagram Mester (5.1) -Diagraph (3.3, 3.4.1, 3.5) - Diacovery Litigation Support (2.3, 2.3e, 3.0) - Diak Optimizer (1.4, 1.5) - Erunacod (1108) - Escribion (2, 2.0A) - Financial Analysis for Farmers (6.0) sel Profiles (1 5, 2 2, 2 3) - Fund Master-TC (3 5) - GSS Arab World (1 36A) - Harmony (2.35, 3.00) • IBM Drawing Assistant (1.0) • IBM Graphing Assistant (1.0, 2.0) • IBM Planning Assistant (1.0) - ICSI Interactive IQ Program (1.11) - Insearch (1.02) - Inamark (4 C3E) - Interceptor IV (1 CA,1 C6) - Intercom 102 (2 30S,4.14) - Kampigruppe (15) -Maintenance Analysis System (400) - Magnatype (14) - Mapmaster (60) - Mean 18 Golf (95) - Minitab (5.1.1) - Multilingual Scholar (2.9) - Multilingual Scribe (2.9) - Paradox (1.0) PBS (10) PC Emulator (1.03) + Petrocaic (85) + PCATE (3.31-4) + PC FOCUS (1.5.2.0.4.5) PC Information System (9.21) - PCLINK (1.0) - Pfs: Access (34, C) - Pfs: File (Tandy B. C) Pts: Graph (Tandy, B) - Pts: Pien (Tandy, B, C, 200) - Pts: Report (Tandy, 1 00. 1 00 00. B. C) - Pls:Write (Tandy, 1.00, 1.01, C, 2.00) - Picture Perfect (3.3, 3.5) - PLC-2 La Logistics (2/11 67) - Pluto ('84) - Print Mester (1.1P) - Print Shop (Early '85, Late '85, '86) -Pro-Cite (1.2) - Quicken (84) - Real CICS (1.10) - Real Estate Appraisal System (87) -Redboard - Residential Appraisal Processor (RSC) - Screenio for Cobol (20) - Sidekick (1.56B) + Sketch Processor (SSK) + SmARTWORK (1.0 r 8-10, 1.1, 1.2 r 3.7) + Softbol II Runtime System (2.11.) (11) - Softbridge Financial Planner (2.1) - Spectra Be Systems (3.01) - Spettight (1.0) - SPSS Statistics for the IBM PC (1.1) - Star Trek: The Kobaysahi Alternative - Superpage - Statet (2) - Tango PCB Layout System (3 03, 3 04) Tango Route (1.10) - Techsonix Digitizer (2.6M) - Taylor Allen Bradley Programmer (6.19) • T-Bond Trading System (84) • Tencore Authoring Sustem (3.00 Beta) • Teatex (1.5) • Type 1 (Broderbund) (87) - Universal Life Pers. Prop. System (6 4N) - Versattie Report System (2.31) - Video Store Manager (35) - What's Best (1.1) - Westinghouse Nume Logic (2.1.3.0) + GENERIC PROLOIL Uniocker - GENERIC PROLOIL Cleanic - GENERIC SUPERLOIL Unlocker - GENERIC HardDisk SUPERLok - GENERIC EVERLOCK Unlocker

We liked UNlock MasterKey, from TranSec Systems, because it doesn't copy software,

> it removes copy protection and that's what we want.

we also like the speed at which it removed the copy protection and the informative documentatin that accompanied the package.

Unlock MasterKey is simply the most elegant of those we tested and it is well worth its \$159.95 price



UNIOCK MASTERKEY
MAGAZINE
EDITOR'S CHOICE
NOVEMBER 24, 1987
CHOICE

JANUARY 12,1988 • PC MAGAZINE

BEST OF 1987 AWARD UNlock MasterKey

for 1807 PC Magazine's authors and editors chose the significant contributions and most favored products of rear. They called UNlock MasterKey unlocking tools altimate equalizer for removing copy protection.

GAMEMASTER UNLOCK Album "D

Unlocks Over 60 Games Call for Complete Listing Advanced Flight Trainer '87 Ancient Art of War '87 California Games'88 Chessmester 2000 All Gaunttet '87 Gunship 8 67 30 Helicopter (Sierra) All Indoor Sports

Kerateka Kerateka Larry in LLL '87 Mean 18 '85,87 Seerch & Destroy Test Drive EGA '87 Where in Europe Carmen'88 Where in USA: Carmen'87 Where in World Carmen'87 Where in World Carmen'87

"Add \$4 00 ship hand
CHOICE OF THE CRITICS!

ERSONAL
"UNlock has two particul
endearing characteristic
rks, and works aimly! it was able to guid
duce unprotected copies ... These copies
floamed flawissels, and endease of these

BYTE "UNlock ... It's menu-driven and works fine on the program its supposed to work on: Jotus 1-23, dBAE 81, Framework, Symphony, Paradox and several others."

Jany Pournelle

Winn L Rosch

UNLOCK S79.95*
Album "D" Plus

BASE in a disklift Plus 1:0

(100 ft 100 ft 100

Coderince Detailed in Entering 23 of - Multilinguist Scrible (25 Multilinguist Scrib) (25 Multilinguist Scrible (25 Multilinguist Scrible (25 Multil

More than 50,000 Copies Sold!



■ LANGUAGES

background color, and finally the foreground color. For example, red on blue is -14, yellow on green is -2E, and so on. You insert these color codes directly into the WriteLn statement. Except for its ability to set colors, the new WriteLn is fully compatible with the old one.

Jeff Roberts Ogden, Utah

I don't know if Mr. Roberts will recognize to his program—legs the cancep integrity changed the implementation. The original program wrote direct, the original program wrote direct, between which common to the control and monochrome at once, As usual, this control and monochrome at once, As usual, this control and placements for the Window. Text. On and TextBackground procedure: I was and TextBackground procedure: I was able to avoid these replacements by able to avoid these replacements by all the procedure is the control that the control the control that the control that of the

dure to write characters.

The variable OnColor keeps track of color commands, if if it 0, then if the character is not a ", we use INLINE code to jump directly to the old Conduct routine, if it is a ", wese 100 Color to 1. ProChar interprets the next character as a back with the conductive of the c

The demo program prints a color chart, so you can select the correct two hex digits to produce whatever color you want.

In Turbo Pascal, Version 4.0, you

would write a Text File Device Driver instead of using the technique here. TFDDs are quite powerful, but rather too large for the scope of this column.

Neil J. Rubenking

SPEAK YOUR LANGUAGE

Share your knowledge of BASIC, C, Pasad, FORTRAN, and COBOL with Languages readers, and we'll pay you \$50 or more for any tips we print, plus an extra \$25 fj you swinty your letter on a disk. If you send a disk, please include a printout, Mail your contributions to Languages, PC Magazine, One Park Avenue, New York, \$10,000 ft. \$20.000.

BASIC PROGRAMMING TOOLS

Whather you're a coccoped expert or just starting out

We'll help you create programs that run faster, work harder, and simply look better. All Crescent Software products include source code, demonstration programs, clear documentation. and a 30-day guarantee.

• QuickPak More than 65 essential routines for BASIC programmers including windowing, access to DOS and BIOS. searching /sorting string arrays, Lotus* and pull-down menus, data input, and more. QuickPak is loaded with examples and tutorial information, and comes with The Assembly Yuchr—an introductory guide to assembly language from a BASIC perspective. 569



Mew OuickPak Professional

The most comprehensive set of tools were developed for BASIC programmers. Hundreds of assembler and BASIC subroutines Including array manipulation, pop-up utilities, multiple windows, mouse support, scientific and financial functions, multi-tasking menus, and more. includes dozens of examples and complete applications. 5149

• QBase A superb screen designer and full-featured relational database with BASC source code to allow customizing. QBase provides a complete database, and is outstanding for creating titles, help screens, and product demos. \$99

• QBase Report Enhances QBase by generating reports with multiple levels of sorting, record updating, and browsing. Report comes with a complete time billing application for computer professionals. \$69



GraphPak A complete collection of BASIC subroutines for displaying presentation quality 30 bar, line, and pie graphs from within your programs. Includes sophisticated font and tile editors. IEGA/ VGA recommended) \$69

GraphPak Professional All the features of GraphPak plus scientific graphs, 3D surface plots

and multiple fonts. Also comes with very fast text-based bar charts. \$149

Aleji LaserPak A comprehensive

**LaserPak A comprehensive set of subroutines for generating graphics on a LaserJet or compatible. includes scales, grids, text labeling, HI-Res pattern editor, and control over all LaserJet commands. \$69

OuickMenu A full-featured Dos menu system for novices and experienced users. Define the menu tities and Dos commands for each choice, and they will be executed automatically. OuickMenu is not memory resident, and features context-sensitive heip and optional password protection. 549



 QuickTALK magazine is our way of saying thank you. The catalog includes feature articles, tips and tricks, and latebreaking news about BASIC. Call or write for your copy. FREE!

CRESCENT SOFTWARE
11 Grandview Avenue, Stamford, CT 06905 (203) 846-2500
Separate versions available for QuistiAsst and Turbo Balse—plake specify when ordering. Trade-ups are available to professional versions—call for information.

ordering, Trade-ups are available to professional versions.
Add S3 per order for shapping / 510 overnight — Foreign 510
day, Visa, M/C, C.D.D, and checks accepted.

CIRCLE 360 ON READER SERVICE CARD

Corporate America Trusts DMP

Black & Decker Chevron Oil

Coca Cola

Merrill Lynch

Proctor & Gamb

DMP XT-4/10™

- 4.77-10 Mhz Speed Selectivity
- Phoenix Bios⁵ 8088-1 Processor, 8087-Ready
- AT-Style Case, w/key Lock Turbo, Power & Disk LED's Hardware Reset & Turbo Switches 150 Watt Switching Power Sappily Parallel, Serial & Game Ports Dual Floppy Disk Controller Ciock Caiendar w/Battery
- Clock Carendar W/Battery
 Tactile 101-Key Keyboard
 360KB Floppy Disk Drive
 Operations Documentation
 One Year Warranty
- With Mono Monitor & Card. \$499
 With 3DMB Hard Disk Drive. \$799
 With 6DMB Hard Disk Drive. \$949 With CGA Color Monitor & Card\$699
- With 30 MB Hard Disk Drive. \$999 With 60MB Hard Disk Drive. \$1149 With EGA Color Monitor & Card\$899 With GOMB Hard Disk Drive. \$1349

DMP 286-6/12 STANDARD FEATURES 6-12 Mhz Speed Selectivity

- 6-12 Mil-Speed Selectivity
 Placenia SiecPlacenia SiecRozeia Francisco, Rozei-Pauly
 Al "Deub-Saur", case "Wally Lot Trache, Power & Dick Lift",
 Al "Deub-Saur", case "Wally Lot Tache, Power & Dick Lift",
 Rardware Beach & Turbo Switches
 200 Watt Switching Power Supply
 Roppy Water Dick Controller
 Cock Calendar w'Extory
 Cock Calendar w'Extory
 Taclin 1071-18; Reboard
 1.208 Floppy Oick Drine
 8-Expansion Side
 Expansion Side
 Reproduction
 Decreamentation
 One Year Warraction
- One Year Warranty Monochrome Configurations
 With Mono Monitor & Card. \$849
 With 60MB Hard Disk Drive. \$1299
 With 80MB Hard Disk Drive. \$1549
- CGA Color Configurations
 With CGA Color Monitor & Card.......\$1049 With 60MB Hard Disk Drive. \$1499 With 80MB Hard Disk Drive. \$1749 With EGA Color Monitor & Card\$1249 With 60MB Hard Disk Drive. \$1699 With SOMB Hard Disk Drive. \$1949 selone. Add \$25 for full size AT case on 286 pretoms



... You Can Too. TOLL FREE!

DMP386-16/20 **DMP ADVANTAGES**

- 16-20 Mhz Speed Selectivity 80386 Processor, 80387-Ready
- **Full Size AT Case**
- Full Size AT Case
 Turbo, Power B. Disk LED's
 Hardware Reset & Turbo Switches
 Hardware Reset & Turbo Switches
 200 Wast Switching Power Supply
 Floopy/Hard Disk Controller
 Clock Calendar W/sattery
 Tacille 101-Key Keyboard
 1.2MR Floopy Disk Drive
 & Expansion Slots
 Operations Documentation
 One Year Warranty

- With Mono Monitor & Card. \$1699
 With BOMB Hard Disk Drive. \$2099
 With BOMB Hard Disk Orive. \$2349
- With CGA Color Monitor & Card. \$1859 With 60MB Hard Disk Drive \$2259 With 80MB Hard Disk Drive \$2549
- With EGA Color Monitor & Card \$2099
 With 60MB Hard Disk Driee \$2499
 With 80MB Hard Disk Driee \$2749

20 Mhz

0 Wait

We accept credit card, COD and APO/SPO orders

We accept Purchase Orders with approved credit

In-stock orders shipped within 24 hour

No sales tax (Michigan friends add 4%)



(313) 422-1200 Main Lines (313) 422-1286 Tech Support (313) 422-1289 Fax Line



Discount Micro Products, Inc. 34360 Glendale Livonia, Mi 48150

Hours: Monday - Friday 9-00 am - 7-00 nm EST Saturday's 9:00 a.m. - 5:00 p.m. EST

.

CIRCLE 229 ON READER SERVICE CARD

Why this publication and more than 1,200 others let us go over their books

once a year.

Some publications, we're sorry to say, keep their readers undercover. They steadfastly refuse to let BPA (Business Publications Audit of Circulation, Inc.) or any other independent, not for profit organization and their circulation records.

On the other hand, over 1,200 publications (like this one) belong to BPA. Once a year, BPA auditors examine and verify the accuracy of our circulation records.

The audit makes sure you are who we say you are. The information helps advertisers to determine if they are saying the right thing to the right people in the right place.

It also helps somebody else important: you. Because the more a publication and its advertisers know about you, the better they can provide you with articles and advertisements that meet your information needs.

BPA. For readers it stands for meaningful information. For advertisers it stands for meaningful readers. Business Publications Audit of Circulation, Inc. 360 Park Ave. So., New York, NY 10010.



PC TUTOR



Why DOS needs the COMSPEC variable; a quick tutorial on pointers in a text file; a simple method of passing parameters to BASIC; and understanding how ERRORLEVEL is used.

PASSING ARGUMENTS USING DOS

I'd like to use a BASIC program to perform a series of repetitive functions as a "subroutine" in the batch file. To do this, I need to pass a single number or letter as a "switch" to the BASIC routine to tell it what to do. Is there a simple way to pass an argument from a DOS batch file to a BA-SIC program?

Michael A Menzies

Calgary, Alberta Canada

There is a relatively simple way to pass parameters from a batch file to a BASIC program using the environment as a scratch pad. Since batch files are involved, I'll assume that the BASIC our tept to is the interpreter version, and not a compiler version like QuickBASIC or Tubo Basic. To take advantage of this method, you will need BASIC 3 or a later version.

A working example is the best way to demonstrate this technique. Create a batch file named FILES.BAT that contains the following three lines:

REM Batch File FILES.BAT SET ARG=%1 BASICA FILES.BAS

Similarly, create a file named FILES BAS that contains these four lines:

- 10 REM BASIC program FILES.BAS 20 A\$=ENVIRON\$("ARG") 30 FILES A\$
- 30 FILES AS 40 SYSTEM

With both of these files in the same directory, and the BASIC interpreter either in the same directory or in a directory included in your PATH statement, execute the batch file by typing

FILES *.*

The filespec "\"e.", passed as an argument on the command line, is available in the back file as replaceable parameter 1 (%1). The filespec is thus stored in the DOS environment as the value of the variable ARG, where it can be accessed by any program or both file. The BASIC interpreter is then started and runs the program, FILES BAS.

FILES. BAS retrieves the filespec from the environment using the BASIC ENVI-RONS function which searches the environment for the variable name given and, if found, return its value as a string. The string, which now contains the filespec, is then passed to the BASIC FILES command, which prints a list of files. Finally, the BASIC program returns control to the batch file.

■ It's not wise to remove COMSPEC from your environment. It's much simpler to expand your environment using the SHELL statement USING THE COMSPEC VARIABLE

I have discovered that the COMSPEC entry in the environment is not used by COMMAND. And since none of my application programs (that I'm aware of), make use of it, could I remove it to increase the useful size of my environment? Would I be setting a booby trap? I haven't been able to think of any reason for a program to care about the COMSPEC entry, but there must be one.

Charles H. A. Heitzeberg St. Louis, Missouri

I'd advise against removing the COM-SPEC entry from your environment. It's much simple; just to expand your environment space as needed using the SHELL statement in your CONFIG SYS file. The COMSPEC variable, the command processor, and the SHELL statement were discussed in detail in PC Tutor, April 26,

The COMSPEC entry is placed in the environment by DOS when it initializes the system. The string COMSPEC points to is the full pathname of the file DOS is to use when it needs to reload the transient portion of COMMAND COM. On my system, for example, the entry is

COMSPEC=F:\COMMAND.COM

In DOS 2.x versions, this variable is set properly at boot time. It's true, however, that changing the value of the variable later does not cause DOS to reload from the new pathname. In DOS 3.x versions, changing the COMSPEC anytime after booting will have the expected effect: DOS

Software Excitement's User-Supported Collection TOP 40 DISKS For IBM PCs and Compatibles

\$275 Ten or More OR Small

FREE Same-Day Shipping (orders of 5+) Your Satisfaction Guaranteed!

BUSINESS/ACCOUNTING/FINANCE/DBASE
| Personal Finance Manager - Menu-driven savings, check, and investment inactes
| E-Z Forms - Make generating any type of business

ings, check, and investment tracker
E-Z Forms – Make generating any type of busine
form easy
Portsworth Package – Monitors and evalual
your investment portfolio

Mr. Bill — A complete and evolved billing system for your business (2 disks) Block Charting System—Creases high/low/ close, moving average, and other charts Finance ill—A powerful bookkeeping

PBase - Relational DBase with query largu MallMaster - Full-featured mail list manage PC-File a - The most coverful DBase we have

WORD PROCESSING

PC-Write 2.71—The most complete and powerd processor (2 disks)

Letter Writer—Makes letter writing easier and fun

Tun | PC-Pad 1.31—An integrated word processor a spreadsheat | New York Word—Complete with mail-merge, sp screens, and more EDUCATION

etc. (CGA)*

Typing Tutor—its easy to improve your typing skill with this handy teacher!

DOS Tutor—This interactive tutor makes learnin DOS easy for the new user

RibbeO—The typer Ribber (IC) in this tun setting

BibleQ - Test your Biblical IQ in this fun setting Spanish I - Seginning Spanish for the stude inquires BASICA or GWBASIC) PolyGlot - Provides a learning environment if seat vocabulatory of several languages

her vocabulary of several languages using imputer fun and educational (CGA)*

UTILITIES/APPLICATIONS

Deak Matter—A dak fur of Science-His control Home Inventory—Keeps track of your person litems HDMenu—Puts the programs on your hard disk

menu. Has security features
SimcQA - Allows a monochrome system to run mcCGA programs
Silo-Works - An all-in-one filer, letter writer, a

| Bearner Maker - Make your own custom banne with the easy-to-use package | Fest Food - Evaluates the nutritional value of t products of most national fast food chains | ELISA Insults - A historium version of the ferro

ELISA Insults – A hilanious version of the famo computer psychiatrist. Detablese Publisher – Prints a catalog of up 1000 name GAMES

| Strillar -- Helicopter attack simulation. Risk is also included (CGA)*
| 3-D Packman -- is great! Also includes Kong and Spacevar. (CGA)*
| Q-Bert -- Play the famous arcade hit on your computer. Other games, too (CGA)*
| Idenopoply -- Great color and sound (CGA)*

JetSet – A jet hight simulator
| Hopper – Great Froger ctone (CGA)*
| Diamond Measter Baseball – Simulate the pteyby-play of baseball | 18 Hole Simulate for | 18 Hole Simulature Gotf 3.0 – Exciting game for |

all ages (CGA)*

Wheel of Misfortune -- Sony, Vanna White not included with your order!

Color Graphics Adapter card required.

Free catalog with order or request

SOFTWARE EXCITEMENT

Service with Excellency

Po. Box 3072, CENTRAL POINT, on 87502

No of disks. Cost of Disks 8.

Shipping Into
14-asd 52 Total anclosed 5.

5 2nd Day—add 53 mas sheet—include phone
(503) 772-6827
Mon-Fri ham-tigen Sas-Sun Barr-Spri

PC TUTOR

will search for COMMAND.COM in the new path. This is another good reason for upgrading.

When a program has to locate a copy of COMMAND.COM, using the COMSPEC variable is the easiest way to do it. This technique was originally used by Charles Petzold in his DDIR utility (Programming, PC Magazine, October 1, 1985) in order to load and execute a secondary command processor.

Similarly, using the line

COMMAND /C SUB.BAT

in a batch file will load a secondary copy of COMMAND.COM, execute the batch file SUB.BAT, then return to the original batch file. If COMMAND.COM isn't in a directory that's included in your path, you'll get an error message. But if the COMSPEC parameter is set correctly, using the line.

%COMSPEC% /C SUB.BAT will never fail.

MOVING FILE POINTERS

I've been working on a small program that reads text files. After reading in a portion of a marked text file, I would like to move the pointer "backwards" within the input file to the nearest marker before reading another portion. As far as I can tell, moving the pointer backwards using DOS function 42 is impossible.

Do I have the wrong idea? Do I have the right idea but have simply fouled up somewhere? Or is it that I just can't get there from here?

> Norman Zacour Wantagh, New York

Whenever DOS opens a file using one of the file handle floritons, it creates a variable that contains the number of the next between the contains the number of the next horson as the file pointer. The DOS Move horson as the file pointer and thus directly stored in the file pointer and thus directly control where information will next be read or written in the file. This process is called "seeking" or "moving the pointer," even thought no physical motion is in The LESEK function is called forth with

PC MAGAZINE

the registers containing the following four lines of information:

AH = 42H
AL = movement method
BX = file handle
DX:CX = offset

When the function returns, if an error is encountered, the carry flag will be set. If successful, the LSEEK function returns the current pointer in the register pair DX:AX.

The movement method used by the LEEK function specifies the ewfl lip position in one of three ways. It may be give as an offset from the beginning of the file, an offset from the end of the file, or an offset from the currentll position. The state of the set from the currentll position. The tineger with the most significant portion in CX. BK must contain a valid file handle that has been returned by either successful Open or Create File call.

When LSEEK is called with AL=0, the wife points who lie scalculated relative to the beginning of the file. Positioning with a negative effect is accepted by the LSEEK function, and will seemingly position the pointer before the beginning of the file. However any attempt to read or write while positioned before the beginning of the file will full. The common function of "rewinding" is the file is easily accomplished by seeking to offset 0 from the beginning.

When LSEEK is called with AL-2, the new value for the pointer is found by adding the offset specified in DX:CX to the number of bytes in the file. All positions are relative to the last valid value for the end of the file. All data currently in the file is referenced as a negative offset.

Čalling LSEEK with AL=2, CK=0, and DX=0 accomplishes two things. First, it functions as a "get file size" function, returning the number of bytes in the file. The new pointer position is 0 bytes from the end and is returned as a 32-bit integer in the register pair DXA. Second, it positions the file to the proper place for appending information. The pointer indicates the next byte to be read or writteniths case the next byte to be read or writteniths case the next byte to be read or drift file.

To simply move around in a file, call LSEEK with AL=1. The offset in DX:CX will be added to the current pointer posi-



MagNetize Your PC

Join PC MagNet and gain instant access to *PC Magazine*'s utilities and editorial staff.

PC MagNet is an on-line information service administered by CompuServe. \$12.50 per hour lets you:

- · Download PC Magazine's utilities
- Download files from the Forum data libraries
- · Talk to editors and columnists
- · Trade tips with Petzold, Duncan, Dvorak, Manes, and Seymour
- Participate in focus groups with industry leaders

PC MagComm-the best way to call PC MagNet!



Cocame

After nearly a decade of being America's glamour drug, researchers are starting to uncover the truth about cocaine. It's emerging as a very

dangerous substance.

No one thinks the things described here will ever happen to them. But you can never be certain. Whenever and however you use cocaine, you're playing Russian roulette.

You can't get addicted to cocaine.

Cocaine was once thought to be non-addictive, because users don't have the severe physical withdrawal symptoms of heroin-delirium, musclecramps, and convulsions.

However, cocaine is intensely addicting psychologically.

In animal studies, monkeys with unlimited access to cocaine self-administer until they die. One monkey pressed a bar 12.800 times to obtain a single dose of cocaine. Rhesus monkeys won't smoke tobacco or marijuana, but 100% will smoke cocaine, preferring it to sex and to food-even when starving. Like monkey, like man.

If you take cocaine, you run a 10% chance of addiction. The

risk is higher the younger you are, and may be as high as 50% for those who smoke cocaine. (Some crack users say they felt addicted from the first time they smoked.)

When you're addicted, all you think about is getting and using cocaine. Family, friends, iob, home, possessions, and health become unimportant.

Because cocaine is expensive, you end up doing what all addicts do. You steal, cheat, lie. deal, sell anything and everything, including yourself. All the while you risk imprisonment. Because, never forget, cocaine is illegal.

There's no way to tell who'll become addicted. But one thing is certain

No one who is an addict set out to become one.

C'mon, just once can't hurt you.

Cocaine hits your heart before it hits your head. Your pulse rate rockets and your blood pressure soars. Even if you're only 15, you become a prime candidate for a heart attack, a stroke, or an epileptic-type fit.

In the brain, cocaine mainly affects a primitive part where the emotions are seated. Unfortunately this part of the brain also controls your heart and lungs.

A big hit or a cumulative overdose may interrupt the electrical signal to your heart and lungs. They simply stop.

That's how basketball player Len Bias died

If you're unlucky the first time you do coke, your body will lack a chemical that breaks down the drug, In which case, you'll be a first time O.D. Two lines will kill vou.

Sex with coke is amazing.

Cocaine's powers as a sexual stimulant have never been proved or disproved. However, the evidence seems to suggest that the drug's reputation alone serves to heighten sexual feelings. (The same thing happens in Africa, where natives swear by powdered rhinoceros horn as an aphrodisiac.) What is certain is that con-

tinued use of cocaine leads to impotence and finally complete loss of interest in sex.

It'll make you feel great.

Cocaine makes you feel like a new man, the joke goes. The only trouble is, the first thing the new man wants is more cocaine.

It's true. After the high wears off, you may feel a little anxious, irritable, or depressed. You've got the coke blues. But fortunately, they're easy to fix, with a few more lines or another hit on the pipe.

Of course, sooner or later vou have to stop. Then-for days at a time-you may feel lethargic, depressed, even suicidal.

Says Dr. Arnold Washton. one of the country's leading cocaine experts: "It's impossible for the nonuser to imagine the deep, vicious depression that a cocaine addict suffers from."

PCTUTOR

tion. To move 10 bytes forward, use DX=0 and CX=0Ah. To move I byte backwards, use DX=0FFFFh and CX=OFFFFh.

Keen in mind that the registers DX and CX are considered to represent a single 32-bit number. Negative numbers should be calculated as full 32-bit operands. Use the hexadecimal mode of PC Magazine's pop-up calculator, CALC (Utilities, March 29, 1988) to make these calculations easier.

USING FRRORIEVEL

I always enjoy reading PC Tutor to learn from the many tips and techniques presented. In the March 29, 1988, issue, you provided DSKREADY.COM, a program that checks the status of a disk drive from within batch files. The problem is, you didn't give any examples of how to use the program! I've looked for some DOS command or reference to ERRORLEVEL as mentioned in your answer, but haven't found any.

What is the DOS ERRORLEVEL you mentioned? Where does DKSREADY put the result of its disk status checking? How can a batch file access this information to make a decision? A clarification and an example would be greatly appreciated. I would like to use this utility, but I don't know how.

Bert A. Hultman Cudahy, Wisconsin

ERRORLEVEL is part of the batch language available under DOS. The poor organization of the DOS manual makes the definitions of certain commands hard to find. You'll find ERRORLEVEL mentioned in the explanation of the IF subcom-

ECHO Place disk to be copied in drive A: DEKREADT AL IF NOT ERRORLEVEL 1 GOTO DOCOPT ECHO The drive is not responding. ECHO Check that the disk is inserted

zono and the drive door is closed GOTO START COPY A: . . C:

Figure 1: A simple batch file that demonstrates one method of using the ERRORLEVEL indicator returned by the DSKREADY program.

mand under the section labeled "Batch File Commands." ERRORLEVEL is a condition that can be tested by the IF subcommand

If a batch file is to be flexible, it must handle situations differently according to their needs. The only test condition available is the IF subcommand, which takes the form

IF condition command

In the case we're interested in, the condition to be tested is how the ERRORLEVEL. a number from 0 to 255 returned to DOS by the last program to finish executing, compares to a constant. The command can be a program, DOS command, or batch file command. When used with GOTO, the IF command allows branching within batch files based on a program's return code.

When a program terminates, it can pass a "return code" back to DOS. This return code is made available to the batch file processor as the manifest constant ERRORLEVEL. In the program DSKREADY, the DOS Absolute Disk Read interrupt (25h) is used to access the drive in question. If the read is successful, a return code of 0 is passed back to DOS. If the read fails, the error code returned by the

interrupt is used as the return code. The batch file in Figure 1, LOAD.BAT. shows a typical example of how the DSKREADY program, ERRORLEVEL condition, and IF command can be used to simplify an installation routine. The IF test will be true if the ERRORLEVEL is greater than or equal to the numeric value specified. So. the statement IF ERRORLEVEL I will be true for any nonzero value. To force the batch file to jump around the error message if the drive is ready, the test is reversed with the NOT modifier.

ASK THE PC TUTOR

The PC Tutor solves practical problems and explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To see your questions answered here, drop a line to PC Tutor. PC Magazine. One Park Avenue, New York, NY 10016. We're sorry, but we cannot answer questions personally.

PROTECT YOUR COPIES OF PC MAGAZINE

Make your collection of PC Magazine a handsome addition to your affice or home—and pratect and organize your copies for easy reference!

PC Magazine Binders and Cases are made of durable, luxury-laok leatherette over quality binder board. Custom designed for PC Magazine, every order receives FREE transfer foil to mark dates and volume numbers

FOR FAST SERVICE CALL TOLL-FREE 1-800-972-5858

MAGAZINE BINDERS

Hold your issues on

individual rods, \$9.95 each; 3 for \$27.95: 6 for \$52.95

OPEN: RACK CASES Store your copies for



individual reference, \$795 each; 3 for \$21.95; 6 for \$39.95

PC MAGAZINE

Rease send □ Binders □ Cases Quantity, Fayment enclosed \$______. Add \$1 per case! binder for postage & handling. [Outside USA, add \$2.50 per case!binder ordered, US currency only.]

Charge my:

Card No. Fyn Dete

** FO Ro: Number Reco

*PA residents odd 6% spies tax. PC MAGAZINE . AUGUST1988

Hassle

With a backup system from Irwin, you won't have to shuffle floppies all day just to protect your data

Because our tape drives store up to 64 megabytes on a single minicartridge.

In a fraction of the time you'd spend making floppy backups.

Írwin's EzTape*software makes it hasslefree Instead of complicated commands and pro-



cedures, it has Automatic Backup that you can set and forget. To store data automatically, every night, every weekend-whenever you want.

There's even On-Line Help for fast answers without burying yourself in a manual.

Our drives fit every popular personal computer and our space-saving internal drives fit right into your floppy disk slot.

An Irwin system works with all the popular networks, and just one of our tape drives can handle every computer on your LAN.

And our patented AccuTrak precision tracking technology allows you to transfer data from a PC to a PS/2 to a Mac.

That's a promise no other system makes. because no other system can.

Which may explain why more people buy our minicartridge systems than all others combined.

To learn more, call 1-800-BACKUP1 for vour nearest Irwin dealer.

Where you'll find convincing proof just how easy it is to save your data.

And your peace of mind.



© Copyright 1988, Irwin Magnetic Systems, Inc. Irwin and EcTape are registered trade-marks and Accutrak and Irwin BACKUP are trademarks of Irwin Magnetic Systems, Inc. Other brand or product names are trademarks or registered trademarks of their

New diskdoubler doubles the storage capacity doubles the storage capacity of your bard disk



for \$189

Upgrade the disk drive in your PC the easy way!

Datran's new DiskDoubler dd2000 is a short card that simply fits into any available slot on an IBM, PC, XT, AT, 386 or compatible, DOS 2.0 or greater.

Upgrade a 20 MB disk into a 40 MB. The DiskDoubler lets you double the storage capacity of any hard disk without loss of performance. No matter what size hard disk you have, the DiskDoubler will double it.

Works With All Data. The DiskDoubler compresses data stored on a hard disk, including application programs, program files, COM and EXE files. You will appreciate the doubling of capacity for word processing, spreadsheets, and database files.

Powerful dBASE Capacity. The Disk-Doubler is especially powerful when handing dBASE I, III and III Plus files, storing on the average three times as much data on your hard disk, i.e., your 20 MB hard disk will perform like a 60 MB disk. ... as 60 MB disk will at like a 240 MB model. It works equally well for any size hard disk. ... and for only \$189.00. Principle of Operation. At the heart of the DiskDoubler is a new, powerful high-speed data compression microprocessor that incorporates Datran's state-of-the-art data compression technology, which represents years of research and development.

Totally Transparent Operation. Datran's high speed data compression technology coupled with our extensive operating software allows the DiskDoubler to process data at speeds compatible with disk operating speeds. It looks as though you've added a disk drive of double the capacity to your PC.

Breaks the 32 MB DOS Barrier. Because the DiskDoubler doubles the amount of data your disk drive stores, it effectively increases the 32 MB DOS barrier to 64 MB without any special software.

Simple Installation. Once the simple, fast installation is complete, the Disk-Doubler operates in the background and is completely user transparent. The dd2000 works with yours existing hard disk controller.

No Formatting Required as is necessary with RLL controllers. DiskDoubler will even double the capacity of a drive already using RLL technology.

Low Power Consumption. The 1/2 watt DiskDoubler eliminates the need for upgrading your power supply, as would be needed if an additional disk drive were added pulling 15 to 30 watts.

Long Life Performance. With a long three-year limited warranty, DiskDoubler is a simple, inexpensive and reliable way to double your disk storage.

Satisfaction Guaranteed. Datran backs the DiskDoubler with s 30-day no questions asked money back guarantee.

FOR THE DEALER NEAREST YOU OR TO ORDER DIRECT BY PHONE:



Datrian Corporation/2505 Foothill Blvd./La Crescenta/CA 91214/Phone (818) 248-8780/FAX (818) 248-8788/Felex 4932115/TurboCom (818) 248-8789

BM PC, ALAND DIMER II, IR AND IR FILE ARE TRACEMANS OF the RESPECTIVE OWNERS

CONNECTIVITY **CLINIC**



In this issue and the next, we present three programs to help you monitor commands sent from application programs to the NetBIOS service module.

NETBIOS—REVEALED! I manage a network using IBM's PC Local Area Network Program over Token-Ring hardware. Occasionally, a user accidentally kicks a workstation or it's disrupted by cleaning. This causes network problems ranging from strange workstation responses to total failure. By checking and tightening all of the cable connections. I usually get the network running again. But this doesn't tell me what the problem was.

I needed a better troubleshooting method-one that I could use on a larger network (since we are adding stations) and that could identify "soft" network errors that usually show up when it can't run network applications such as gateways.

Purchasing a protocol analyzer was out of the question. So with the help of J. Scott Haugdahl's book Inside NetBIOS and past Connectivity Clinic columns, I created a poor man's diagnostic tool for NetBIOS networks called NETERROR.

The NETERROR program uses the NetBIOS Status command. When the software module that provides NetBIOS services on any computer receives this command, it responds with 1,922 bytes of information. This command will work even in machines that are otherwise hung because of network errors.

Tom Cervenka Berwyn, Illinois

This letter is only part of the six singlespaced pages I received. It is also only one of several recent letters inspired by the new and much-improved second edition of Scott Haugdahl's book Inside NetBIOS

(Architecture Technology Corp., P.O. Box 24344, Minneapolis, MN 55424).

NetBIOS was never documented or explained well enough so that programmers could experiment with it. Hausdahl's book changed this. It explains the inner workings of NetBIOS and clearly presents the information that programmers need in order to use its functions.

Unfortunately, due to the size of its three .INC files, NETERROR is too long to publish in the magazine. The easiest way to receive a copy of NETERROR is to download it from PC MagNet. Instructions for using this service are given in each issue's Utilities column in the "By Modem'' sidebar However, we will present in these

pages two memory-resident NetBIOS monitor programs written by PC Labs: ENETBIOS and RNETBIOS. ENETBIOS is a program that can run alone or with RNETBIOS and that specifically flags and

 NetBIOS was never documented or explained well enough for programmers to experiment with it. Haugdahl's book

changed this.

reports on error conditions. This will be presented in the next issue. A discussion of RNETBIOS follows.

NETBIOS MONITOR The NetBIOS communications functions

are an important part of PC-based LANs. LAN gateways, some electronic mail programs, and a growing number of networkspecific applications (such as groupcalendaring and workstation remote-control programs, for example) use NetBIOS to perform station-to-station communications across a LAN

In networks using Novell's NetWare or Banyan's VINES, the NetBIOS services are provided by an emulator that is a separate add-on to the operating system. Other network operating systems, notably IBM's PC LAN, use NetBIOS services for all op-

When an application program needs to use NetBIOS services to communicate across the network, it generates a 5C hexadecimal software interrupt. The interrupt is then followed by a network control block, a formatted message sent to the Net-BIOS module asking it to perform one of

several specific services. NetBIOS attempts to perform the service requested by the application program, then returns an appropriate message to the application program.

These monitor programs intercept traffic between the application program and the NetBIOS module. They read the appropriate bytes and report on the screen what these bytes mean in English.

The program RNETBIOS, in Figure 1,

■ CONNECTIVITY CLINIC

This progra			to display METBIOS commands roommand field) and compare is a match then the a diplayed on the CRT.	In 41	or See Loop	el,el lm 3 la_2	; If not 8 ; knep ecanning ; and try for match
					the et	art of the necessor.	
when the sandit tra	ine read	at column 65 and ranger see the bottme it eterte one help you in determin	s between lines 0 and 23. s et the top leaving en sing BETBIOS problems.	1	mov mov int	ab, 63 bb, 6 18b	preed cursor position
*** ***	or bete b	eblie 'coom'			Parent.	di	; Bove row/col
tart:	erg	g,de:comp,ee:coog,es:coo 188h	"		BOY	ab. #2 d1. 45	:net curser position
		initielise		,			
epyright	do	"FC Heganize ", 254,")	of Communications Co.",13,18 Sendol Tigrett","5",28	increment th	e displ	ay line for command and	
ld netbloe	64	2 dup (#)	jetore old interrupt		BOY	de, nobline	into dh into dh iedd 1 to mext line
			16 Control Block command	1	ine cap 170	6,23	jie line >= 23 f jee then line = 6
			seage tehls to produce the	in pr	BOY	ehort la_p dh, f	lyee case time
				1	POT	nobline, dh	jeeve line number
E_teble	8	832h, 835h, 833h, 8638 898h, 811h, 891h, 8129	1, 8385, 8085, 8315, 8615, 8185 1, 8925, 8145, 8945, 8715, 8515		mov int	55.0 185	
	60	817b, 897b, 872b, 852b 866b, 828b, 848b, 822b	n, 6385, 8085, 8315, 8615, 8185 h, 8925, 8145, 8945, 8715, 8615 s, 8155, 8755, 8165, 8945, 8245 s, 8625, 8215, 8615, 8235, 8625		NOT 108	48,09200	poleer display area
en_fn_table	eds	0-offmet fn_table			nov nov int	bh,bh bi,31h cu,35	
nessege tel	te of ME	rates control block com	nande	le Si	Int	186	
ee table	label	byte		14251	lodeh	-1 -1	sload massage string send of string ?
*Tenes	*, e, *cen	ml",0, jetatue",0, jetatu	ie veit", 8, "add zame", 8 mme veit", 8, "add zame", 8 mme veit", 9, "meen veil", 9 ett", 9, "meen grup", 9 ett", 9, "meen grup", 9 ett", 9, "meen grup", 9 ett" ett veit, 9, "etcolyer, 8 ett veit, 8, "etcolyer, 8 etcolyer, 9 etcolyer, 9 etcolyer, 9 edceet dategree", 9 edceet dategree", 9 edceet dategree", 9		0F	al, al la_#	land of string a
redd o	ell welt	. 0, "listen", 0, "listen w	ume weit", 0, "ech cell", 0 reit", 0, "heng up", 0		int	eh, etch	jurise character
no ec	k meed w	elt", 0, "chein send". 0, "c	thair sand wait", 0	In 41	38p	1m_5	instante operactare 3
*chTLs *recei *ases *eend	se seit.	#, "receive eny", #, "rece	ive eny welt", 8	1001	mov mov inc	ah,#2 dl,#5	jet career position
"eend	detegrae	weit", 8, "eerd henedcest	determe",		inc	6,23	
recei	re dates	dategram weit",0,"receive bro	uve detegrme",0 medceet dategrme",0		jle mov	short lm_pl	inest line >= 23 ? iyee, line = 6
-Teces	ve mrees	Aet dategrae veit*, F		lm_p1:	wor		
Interrept t	P* NELDI	s cell end dimploy what	cell use made.		180	bh,bb 18h	
eti	Calcae htee	far , dermothing, eermothing,	eernothing		mov mov int	an, #9208 h1, 31h en, 35 18h	jeleer next line jmake line blue jeleer all attributes jup to 35 apaces
puehf cell	old ne	bios	cell Scs interrupt		pop	44	prestore ourser location
ce11	load re		, for proceeding		BOY LNS	ah, 62 bh, 6 18h	
			black command and display message return from interrupt	le_esiti			prestore registers
iret			return from interrupt		200		Manager Ladinoses
nkioint	endp				209	1	
			d get English equivalent.		949	22	
200_200 ********	PE00	near demothing, eernathin	ig. eeinothing		bob bob bob bob bob bob bob	42	
	posh	ne ha	seve registare				
	bosp	en en		load_neg	endp		
		en de ei d1 hp		grab the int	arrept .	vector.	
	posh			initialine	BERG	Deer	
	posh posh	ie de		1105191180	Calcas:		
	bony bony bony bony bony bony bony bony	••		1026141184	COT COO	4.1	
100000	posh posh posh posh posh posh	••	;Tell the assembler	********	mov mov int	dx.offeet copyright	
400000	rosh.	••	-Cat Dateman country)	1 to C La	mov lat	ah,9 dx,offeet copyright 21h an,de:(2ch)	poet and release environmen
-	posh pop derces	en de	-Cat Dateman country)	and	mov mov int	dx.offeet copyright	post and release environmen
-	posh pop descess mov mov	ee de d	plock command plock command prosper of numbers questify to exect	assema assema	mov mov int mov mov int mov int	ah,9 dx,offeet copyright 21b as,ds:[2ch] es,ax ab,49h	just and release environment
-	posh pop derces mov mov nov locks	es de	yGet network central phick command provide of numbers provide to exact post function number in AL	osyma syma	mov mov int mov mov int mov int	ah,9 dx.offeet copyright 21b as,ds:{2ch} es,as ah,45h 21b el,5ch eb,25h	:get methics interrupt
-	posh pop de rose: mov mov lodak enp je loop	es de	jost network control jalock command jource of mumbers journity to eserch jost function member in AL jostchy jus, treemiets jus, treemiets jus, toop egain	ang cha	mov mov int mov mov int mov int	ah,9 dx.offeet copyright 21b an,der(2ch) ee,ax ah,49b 21b el,5ch eh,35h 21b word ptr old_methios,	jet methics interrupt he jetors methics interrup
-	posh pop derces mov mov nov locks	es de	yGet network central phick command provide of numbers provide to exact post function number in AL	ang cha	mov mov int mov	ah,9 dx.offeet copyright 31h ss.dsr(2ch) es.as ah,49h 21h el,5ch eh,35h 21b word ptr old_methics, word ptr old_methics, ds.offeet methics id,	jet methics interrupt he jetors methics interrup
round + mat	posh pop datoss; mov mov locish essp je loop jep	es de	;Out network central phicek command process of members (Questify to weerch patcher ;Ne, tremitte ;No, loop epain ;No metch found	es ma	mov mov int mov mov mov int mov int mov int	ah, 7 ds.offeet copyright 328 seglect as, ds:{2ch} es, es es, es el, esh el, ich el, el, ich el, ich el, ich el, ich el, ich el, ich el, ich el, ich e	jget methics interrupt bh jetore methics interrupt 2),es jreplace methics interrupt juith etert of program
round + mat	posh pop defree: mov mov lodak eap je loop jee	es de	;Out network central phicek command process of members (Questify to weerch patcher ;Ne, tremitte ;No, loop epain ;No metch found	OPP (Market	mov mov int mov mov int mov	ah, 7 ds.offeet copyright 328 seglect as, ds:{2ch} es, es es, es el, esh el, ich el, el, ich el, ich el, ich el, ich el, ich el, ich el, ich el, ich e	jget methics interrupt bh jetore methics interrupt 2),es jreplace methics interrupt juith etert of program
round + net	push pop datces mov mov locale cap je je jeop jee ching fu	ee de d	;Out network central phicek command process of members (Questify to weerch patcher ;Ne, tremitte ;No, loop epain ;No metch found	include and a second	mov mov int mov	ah, 7 ds.offeet copyright 328 seglect as, ds:{2ch} es, es es, es el, esh el, ich el, el, ich el, ich el, ich el, ich el, ich el, ich el, ich el, ich e	jet methics interrupt be jetors methics interrupt 2],es
	push pop pop da iceas mov mov mov lodale eap je leop jap mov	ee de d	Total network control placed command placed of manubars placed by manubars placed towards placed	initialiee	mov mov int mov mov int mov	ah, 7 ds.offeet copyright 328 seglect as, ds:{2ch} es, es es, es el, esh el, ich el, el, ich el, ich el, ich el, ich el, ich el, ich el, ich el, ich e	be jetore methics interrupt 2], os implace methics interrupt juith etert of program
round + man	posh pop defree: mov mov lodak eap je loop jee	es de	put introck control placed command placed command placed of manibers placed towards placed towar	641,000	mov mov lat lat mov mov lat lat mov mov lat mov mov lat mo	ah, 7 ds.offeet copyright 328 seglect as, ds:{2ch} es, es es, es el, esh el, ich el, el, ich el, ich el, ich el, ich el, ich el, ich el, ich el, ich e	jget methics interrupt bh jetore methics interrupt 2),es jreplace methics interrupt juith etert of program

Figure 1: The assembly language source code for RNETBIOS.COM, a memory-resident NetBIOS monitor program

LAN's Best Friend

Dependable UPS systems from American Power Conversion support the new UPS monitoring functions of:

- Novell's SFT Level 2 NetWare™
- 3 Com's 3S/400 server
- Banyan's VINES™



Here's the American Power Conversion Advantage:

- Systems allow automatic, secure network shutdown during extended power outages.
- No supervisor intervention is required.
- Ideal for file servers which are sometimes unattended or attended by untrained personnel.
- Complete power protection from blackouts, sags, noise, and surges.
 - A broad range of UPS products covers all networking requirements:
 - 330 XT Low cost UPS protection for network workstations 450 AT For AT type servers, 3 Com servers, and CAD workstations
 - 520 ES For SFT Level 2 and VINES file servers
 - 800 RT For large file servers with multiple hard drives 1200 VX For multiple PC's or very long backup power duration.
 - International models available, inquire about our UPS application handbook,

American Power Conversion

2 Columbia Street # P.O. Box 3723 # Peace Dale, RI 02883 # Tel. (401) 789-5735





program with adjustable cache sizes and support the best caching software for your money. Not copy protected.* PC Magazine Nov. 24, 1987

FLASH FEATURES

➤ Speeds up disk accesses
➤ Uses EMS expanded memory
➤ Uses AT extended memory
➤ Uses any nonstandard memory boards

▶ Uses EMS & AT memory togethe
▶ Accesses up to 3 MEGS of RAM

Buffers 26 Device Driven Drives Dynamic track reads

Can glue files into buffer
 Speeds up cursor

cursor speed and prolongs the life of your hard disk. FLASH speeds up data-basing, word-processing, desk-top pub-lishing, CAD-designing and accounting software by as much as 300% or more. Even 386 machines are not at full speed until they use FLASH. It boosts your performance tremendously. FLASH ONLY \$69.95

FI ASH

This rock solid supercharged package accelerates all your disk accesses, increases your

cursor speed and prolongs the

SPOOL - MASTER

SPOOL-MASTER

offers all of the features of standoffers all of the reatures of standard printer-spoolers plus much more. It functions as an extension to your printer's buffer. Thus allowing your program to continue processing while the printer

FEATURES

➤ Redirect printer output to files
➤ Uses AT extended memory or EMS
expanded memory if FLASH is inst
➤ Controls page eject (form feed)
from keyboard ➤ Spooler easily controlled by simple

keyboard sequences ▶ User selectable buffer size Only 8K of RAM is needed to put SPOOL-MASTER to work.

SPOOL-MASTER \$69.95

FOR FLASH OWNERS ONLY \$49.95

INTRODUCING

SAVIOR makes the seemingly

impossible, possible! It raises files from the dead!!

This miraculous package, by automatically "undeleting" files, takes all the worry out of accidental deletes, and saves. No matter how fragmented you'r file has become, SAVIOR returns the original file intact.

SAVIOR also possesses the ability to retrieve previous file versions. It can even revive files "lost" after storing other information on top of them

NO OTHER PROGRAM ON THE MARKET WILL DO ALL OF THIS AND ONLY USE 5K OF RAM! Every PC owner owes it to their PC to invest in SAVIOR

SAVIOR \$89.95

FREE LITH ITIES

FLASH RAM-DISK is a Dynami-cally allocating RAM-DISK which es memory with FLASH. When not in use, memory is not borrowed from FLASH. This maximizes memory utilization

FLASH KEYS speeds up your cursor for word-processing and spreadsheet programs. Scrolling and editing become a breeze instead of a chore. You no longer have to wait for the cursor. YOU choose the cursor speed. Selecting rates up to 6 times faster than that of a normal cursor.



ability to make ANY program a pop-up program, regardless of size. BTD offers all this flexibil-ity while only using 15K of your precious RAM.

FEATURES ▶ Make any program a pop-up utility

- ► Uninstall unwanted TSR's in a single keystroke
- ➤ Reinstall the same TSR's back with a single keystroke
 - Only 15K of RAM is needed Even makes PC-DOS a pop-up utility <
 - BACK-TO-DOS THE POP-UP MANAGER

BACK-TO-DOS \$69.95 FOR FLASH OWNERS ONLY \$59.95

■ CONNECTIVITY CLINIC

hides itself in memory (it takes about 1,100 bytes) and then monitors and displays the commands contained in the network control block that are sent from the application program to the NetBIOS services module.

RNETBIOS contains the English-laneuage definitions for 36 functions that application programs can request. As application programs make these calls. RNETBIOS lists them on the screen. The requests scroll down the screen so that you

RNETBIOS contains the English definitions for 36 functions that application programs can request and lists them on

the screen as they are called by the application.

see a running description of what the application has done The RNETBIOS program also watches

for messages and requests sent from other NetRIOS modules to the module in its machine and reports what type of commands they contain.

For anyone developing or installing applications using NetBIOS, this program is a practical reporting and monitoring tool.

NETWORK YOUR OUESTIONS

Connectivity Clinic gives you practical solutions to networking problems of all types. We'll pay \$50 or more for any tips we print, plus an extra \$25 if you submit your letter on a disk, and we'll gladly answer any questions you have, at no charge, We're sorry, but we're unable to answer letters personally.

Mail your contributions to Connectivity Clinic, PC Magazine, One Park Avenue, New York, NY 10016, or you may contact Frank J. Derfler, Jr., via MCI Mail (be sure to use Derfler's box named CON-NECTIVITY CLINIC).

Spin your favorites with push-button ease.

DIRECT ACCESS. The leading menu system for hard disk management.

IRECT ACCESS is to your software what e jukebox is to records. Both are fun end easy to use. Simply choose a title from an organized listing, push e button end play

your selection

DIRECT ACCESS lets you hoo

over complicated DOS com-

mands, reduces arrors, provides complete usage tracking, and

secures your data with pass-

DIRECT ACCESS toos all the national best seller charts-it's the ultimete menu system for herd disk management. There's no essier, faster or more organized way to play your

Also available, DIRECT NET. the single keystroke network menu systam.

Call for the name of the dealer nearest

1.800.242.6369

word protection. 1621 Westgata Road, Eau Claira, WI 54703, (715) 832-7575, FAX (715) 832-0700 CIRCLE 254 ON READER SERVICE CARD

It uses no gas. And will drive you wild with delight. It's the new Hyundai Super-16T. A fast, powerful, affordable XT-compatible built to go the distance.

It comes fully-equipped. And even includes easy-to-use word processing, spreadsheet, database, spellchecker and communications software. What's more, it's backed by an 18-month warranty, But, best of all, Hyundai's new off-road vehicle is dirt cheap. Just \$999!

lest drive the Super-16T or one of Hyundai's other exciting off-road vehicles today. For the Hyundai dealer nearest you, call 1-800-544-7808 ext. 121.



PC MAGAZINE . AUGUST1988

HOW TO SUCCESSFULLY BUY THROUGH MAIL ORDER AND PROTECT YOUR RIGHTS

Mail order sales are governed by rules of the Federal Trade Commission (FTC) and various state laws. These guidelines are published as a service to you. Remember, the many vendors advertising in PC Magazine are eager to serve your needs.

FTC rules say: 1. The Seller must ship your order within 30 days of receiving it, unless the advertisement clearly states it'll take longer. 2. If it appears that your order will not be shipped when promised, the Seller must notify you in writing in advance of the promised date, giving a definite new date, if known, and offering you the opportunity to cancel the order with a refund or consent to a definite delayed shipping date or an indefinite delay.

3. The Seller's notice must contain a stamped selfaddressed card or envelope with which you can indicate your preference. If you don't respond to this notice, the Seller may assume you agree to the delay, but must either ship or cancel your order within 30 days after the original shipping date promised or required. A prompt refund must be made when an order is cancelled. 4. Even if you've consented to an indefinite delay, you retain the right to cancel the order at any time before the item has been shipped.

been shipped. 5. If you choose to cancel an order, that has been paid for by check or money order, the Seller must mail you a refund within seven business days. If you cancel an order for which you paid by credit card, the seller must credit your account within one billing cycle following receipt of your request. Store credits or vouchers in place of a refund are not acceptable. In the event that the item you ordered is unavailable, the Seller may not send you substitute merchandise without your express consent.

TIPS WHEN ORDERING When ordering by mail: State precisely what mer-

State precisely what merchandise you want, specifying details such as model, make, size, component parts, etc.;

Confirm the price and expected delivery date as stated in the ad; Indicate whether you will

accept a substitute product if the item you ordered is unavailable, and, if not, that your payment should be returned;

Don't send cash, you will have no record of payment if a problem arises, and; Keep a copy of your order and all other correspondence

with the Seller. Your records should include the company's name, address and phone number; a description of the item ordered; your cancelled check or a copy of the money order; record of the date you mailed the order; and any sales slips and shipping receipts.

When ordering by phone: Note the time and date of your conversation and the name of the person you talk

Make a record of your order, the price, its promised availability and the components to be expected; Save all correspondence

Save all correspondence associated with your order, including your cancelled check or a copy of the money order, and any written confirmation sent by the Seller.

Questions you should consider asking: Does the advertised item come with all necessary parts

and accessories? Are they from the same manufacturer? Is it available for immediate shipping?. If not, when will it be available?

Has there been an increase in the advertised price? What warranties does the item carry? Who provides the

service?
What is the Seller's return
policy?

What is the Seller's refund policy?

With whom should you correspond if there is a problem?

IF YOU HAVE PROBLEMS:

1. If you have not received

ways order as promised or if

your order as promised or if the item is defective, immediately notify the Seller in writing referring to your order by description, price, date, as well as by account number and order number, if available. Make sure you keep a

copy of the letter.
2. If you complain by telephone, send a follow-up letter to confirm what was said.
3. If you think the merchandise is defective, reread your product instructions and your warranty carefully to be sure you don't expect features or performance the product is not designed to give. Then contact the Seller for instructions, Don't return it to the

Seller until you have been instructed to do so.
4. When returning merchandise make sure you keep the shipper's receipt or packing slip; your right to be reimbursed for postal cost is determined by store policy.

5. If you have completely dis-

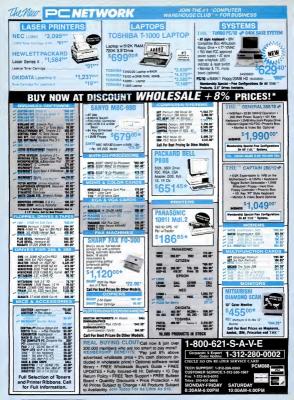
S. If you have completely discussed your problem with the Seller and are still not satisfied, write to the consumer complaint agency in the Seller's state. If you paid for the merchandise by credit card, you may have rights to withhold payment under a Federal law called the Fair Credit Billine Act.

PC Magazine's Direct Marketing Connection For PC Products And Services

For many of you, mail order is your primary means of purchasing PC products and services.



*Starch Study, July 1986



Designer Carry Case for Laptops: Extra pockets for portable printer, battery pack, pocket modern, manuals & software sic. Comes with handle and shoulder strips, Fits NEC EL & HO and all Toshibs Laptops (succept 13300).

With any Laple TOUCH BASE Systems World Port Pockel Moderns: Both 1200 & 2400 use own bettery. Operate on Bell and CCITT standards, 2400 includes AC Adapter and Carbon Copy PLUS commisse Comes with 25 pin lemale connector. For Toshiba adapter cable, add 20.



WonUnder: Single Card Expansion slot for Toshiba Laptops. Supports most Toshiba compatible cards of 10° or less such as LAN and EGA cards. If all you need is one expansion stot, this is your low cost alternative to expansion chasis. Specify T1100+, T1200 or T3100/T5100

579

529

519

35

NOVATION Parrot 1200 External modern. World's smallest (size of an audio cassetta) external modern. Does not require any batte or line power Includes comm. software Comes with 25 pin len nector. For Toshiba adapter cable, add 20

1200 / 2400 . 159 / 259 With any Laptop 1200 / 2400 Only 129 * ABSOLUTELY THE B-E-S-T PRICES ON TOSHIBA LAPTOPS ANYWHERE * SYSTEMS PRINTERS MONITORS FAX MACHINES/BOARDS

AMDEX Monitor 722 ... 449
LOGITECH AutoSync with EGA Card,
LogMousa & Pairt Show ... 669
MAGNAVOX MultiMode 6CM673 499
MITSUBISH D Scan 1371 ... 499
With Tits & Swivel ... 515
Diamond Scan Tit & Swivel ... 30 ALPS Allegro 24 pin ALQ 200 Color 16/24 pin ALQ 300 Color 16/24 pin NEC MultiSpeed EL MultiSpeed EL II 439/469 MultiSpeed HD w/20 MB 2199 Battery Pack-Specify EL or HD BIDI Tractor: 200/300 70/90 Carry Case: EL/HD 69 Ribbon: ALO Black/Color 15/20 P2000 w/Tractor py 5.25° Ext 380K for HD 339 Modern 1200/2400 Int 269/339 P2100 w/Tractor P2400 Color, w/Tractor 24 pin TOSHIBA LAPTOPS NEC MultiSync II-1402 NEC MultiSync PLUS + DICONIX Inkulet 180 parallel with 3' or 6' cabla With any Laptop NEC P2000 5200/5300 496 T1000 w/out Carry Case 71900 w/out Carry Case 729
71900 w/cury Case 789
71100+ w/Carry Case 1329
7112005-2 hopey w/C Case 1529
712005-8 seckle w/C Case 1689
712005-8 seckle w/C Case 2389
73120 w/Carry Case 2399
73120 w/Carry Case 2929 NEC Multidync PLUS
PGS UiraSync .

BONY 1311CR-13* Trinition Color
Ramcos TV & R08 Monitor
Sony 1311 lo IBM Cabla
SONY Multiscan 1303
SONY Multiscan 1303
Sony 130312 to IBM Cabla
Sony 130312 to IBM Cabla
Sony 130312 to IBM Cabla 5200/5300 Coier Rii 5200/5300 Cut Sht Fdr 5200/5300 Uni-Di Tractor: P6/P7 Bi-Di Tractor: P6/P7 Cul Sht Fdr: P6/P7 169/199 50/70 T3200 w/out Carry Case T3200 w/Carry Case 3599 230/290 TAXAN 770 MultiVision plus
ZENITH ZCM-1490 Flat Screen
With Zenith Titt & Swivel
Zenith Titt & Swivel

4629 * TOSHIBA 321SL/341SL 459/599 KENSINGTON Printer Stand * With Printer T5100 w/ Carry Case . 469 ACCESSORIES for Toshiba LapTops 10 . With Laptop Use Second Prica AC Adapter: T1000/1100 + 75/60 AC Adapter: T1000/1100 + 65/50 Bettlary Charger: T1200 - 299/210 Gattary Pack: T1200 - 65/70 Battary Pack: T1200 - 65/70 **DRIVES & BACKUP** PLUS HARD CARD: Single Slot 20/40 MB 49 69 Carry Case Specity model 89 Designer Carry Case w/pockets for SW. manuals, portable printer atc Fits all (except T3200) 149/13 Expansion Chasis w/interface for 149/130

1100 + /1200 or 3100/5100 669/629 onUnder: Expansion slot for 1100 +, 1200 or 3100 / 5100 299 / 270 manual. One year warranty PC/XT Mtng Kit & Filler Plate POR AT: 40 MB w/partitioning aw MITSUBISHI 26ms RLL Cartried SEAGATE ST 251-1 26 ms AT Mounting Kit 299/290 359/640 . . 1239/1200 ARCHIVE: Uses Floppy Cont/DC2000 40 MB: External for PC/XT 449 319/300 odem 1200 No Slot: T1200 299 When installed 350 odems: T1100 + /1200/3120/5100 MOUNTAIN: Uses Floppy ConsDC2000 40 MB: Internal for AT 379 DC 2000 Single / Box of 5 DC800 Single / Box of 5 25/120

8087-3 PC/XT 5 Mhz 8087-2 PC/XT 6 Mhz 80287-6 AT 6 Mhz 80287-6 AT 6 Mhz 80287-10 AT 10 Mhz 80387-16 for 386 Machines 80387-20 for 386 Machines MODEMS LAP TOP Modems . See SYSTEMS EVEREX 1200 Int w/BitCom 96 2400 w BitCom Int/Est 179/199 HAYES 12008/1200 Est 239/299

UNIVERSAL TIT & Swivel

64K RAM 120ns Set of 9 256K RAM 120ns Set of 9 8087-3 PC/XT 5 Mhz

MATH/RAM CHIPS

HAYES 1200B 1/200 Ext 239/2299
For SmartCorn II Add 40
NOVATION Parrot 1200 Ext. Size of
Cassetts. Needs no pur/ bettlery 1
PROMETHEUS 2400G Ext 179
2400B in half Card w/aw
TOUCHEASE SYSTEMS
World Port 1200 Ext 159 World Port 1200 Ext 2400 Ext w/AC Adepte

* FREE DELIVERY * * PREPAID ORDERS IN CONTINENTAL USA ONLY *
Simply mail the check for the susci amount (CA add 69) as shown here with your
order. We will ship your order UPS Gound, FREE of any other charges. It is that
simple. For 2 Day ARR shipment, add 2% (Min \$10), For Printers & Monitors 50,
(Min \$30), Money order (Bank check orders shipped immobilist). Personal (50,
(Min \$30), Money order (Bank check orders shipped immobilist). Personal (50,
(Min \$30), Money order (Bank check orders shipped immobilist). Personal (50,
(Min \$30), Money order (Bank check orders shipped immobilist).

919/1119 HARP UX-140/UX-160 FAX SOARDS
PANABONIC FAX BOARDS
PANABONIC FAX BOARDS
PANABONIC FAX BOARD
QUADRAM JT FAX BOARD
THE COMPLETE PC FAX BOARD 1079/1499 DISPLAY CARDS

With Monitor Lise Second Price With Monitor Use Second Price
ATI VIP 2991/27C
QENCIA Super/EGA H/Riss + 2191/19C
Super/UGA H/Riss + 2201/19C
Super/UGA H/Riss + 2200-10 4/291/40C
PARADIZE AutoSwitch 460
Paradize VGA Plus 2001/26C
Paradize VGA Plus 4091/40C
Paradize VGA Plus 4091/40C
Paradize VGA Plus 2001/26C
Paradize VGA 429/400 199/170 269/250 449/400 199/190 229/200 299/270 549/500 Vega VGA
Vega V-RAM VGA (256k)
Vega V-RAM VGA (512k)
ZENTH Z-449
9 to 15 Pin Connector-Requir 699/649 279/250 some Monts Gem Graph

KEYBOARD/MOUSE KEYBOARD/MOUSE
KEYTROMEG 1019 for 1618 MP. CY. SECTION CONTROL TO SECT

POWER REPLACEMENT POWER SUF For PC XT 150 Watts For AT 200 Watts 69 For PC XT 150 Watts
For AT 200 Watts
For AT 200 Watts
DATASHRELD Surge Pro 100
300 Watts Turbo Backup
450 Watts Turbo Backup
525 Watts Turbo Backup
525 Watts Turbo Backup
525 Watts Turbo Backup
525 Watts Turbo Backup
526 Watts Turbo Backup
526 Watts Turbo Backup
KENSNGTON Masterpiece
Masterpiece Pflus
Masterpiece Pflus
Masterpiece Pflus 79 399 469 569 899 / 829 99 109

When installate codes: 1100 + 1200 / 3120 / 5100 Foshba 1200 Im 289 / 280 / 280 Foshba 1200 Im 289 / 280 / 280 Foshba 1200 Im 1 + 180 / 1 TOSHIBA T1000 .

int owed

T5100 w/out Carry Case

rry Case for T1000

oppy 5.25" Ext 360k

mory 766k: T1000 mory 384k: T1100 +

mory 3MB: T3200

em 1200 int: T1000

ory 2MB: T3100

TOSHIBA 321SL/341SL 459/599 > * SUPER SPECIALS * T1000 w/out Carry Case T1000 w/Case 8 755K Card TOSHIBA 3218L w/Psr Cobie
TOSHIBA 3415L w/Psr Cobie
ARCHIVE 40MB External PC/XT
MOUNTAIN 40MS Internal AT 470

T1100 = w/Carry Case T1200F, 2 toppy w/Carry Case T1200FB, 2 lioppy Backlit w/CC T1200N, 1 floppy + 20MB w/CC ALPS Allegro 24 pin w/per cable ALPS ALQ 300 24 pin w/per cable T1200NB, 1 F+20MB BacHE W/CC BNARP UX-50/UX-80 BNARP UX-140 (UX-160 T3120 w/Carry Case 2990 T3200 w/ Carry Case Touchbese Systems World Port with T5100 w/ Carry Case * FOREIGN ORDERS * For foreign orders add special handling charge

359/340

1049/1020

of \$30 per order. Air shipments add 10% (Min. \$50). For Printers & Montors 30% (Min. \$150). es may be more. Credit card orders, + COO + OISCOVER + MC + VISA + AMEX + OPTIMA + ECT

* PREPAID BY CHECK ONLY *
POSTMARKED BY AUGUST 20, 19 PLUS Nerd Card 40 MB NAYES 12005 Internal NAVES 1200 Futs For SmartCom IS Add MOUSE SYSTEMS PC Mouse Bus LOGITECH PS/2 Mouse 875/955 LOTUS symphony 3 5" Ver 1 2 LOTUS Metro 3 5" Ver 1 0

NEC MultiSync II-1402...579 Display Card ... 549

895/1095

BORLAND Sigenick. Specify 525 or 3.5 29 PC Peint Brush / Gern Graph 25.740 Shipping charges very (Mn. \$10). From reflect decount for advance payment. Personal I Oc. checks delay shipment. 2/3 weeks. Add 2% (Mn. \$5) for COD & Discover. 3% for MC/1/(sq. and 5% for Arrier, & Optima. COD recovers. 2/3 wields Add 2*N (Min. bo) or Cook is processe; and or min. It as an are at all cooks and coated coated or coated

MITEUSIEM 1371 m/TH & Swivel TAXAN 770 Plus w/Gen BONY 1311 w/cable for ISM BONY 1303 w/cable. IBM or Apple BONY 1302 W/cable ISM or Apple ZENITH ZCM 1490 Flat Screen with * APO * FPO * For APO/FPO orders, add special handling

NEC MultiSpeed EL II w/Cone NEC MultiSpeed ND w/Cone NEC P2200 Per w/Cobie

charge \$30 per order Shipping charges add 5% (Min. \$20). For Printers & Monitors 10% (Min. \$40). Some itams may be more. No COD orders. Credit Cant orders, add 5% to amount

FAX: 714-891-2384 IICD

714-897-2100

12605 HOOVER STREET, GARDEN GROVE, CA 92641

PLEASE REFER TO AD # PC 839

SAVE 50% or more with our National Computer **PRINCE** brand products.

NATIONAL NATIONWIDE 1-800-292-6272

We have always being

MARYLAND 1-800-442-6272

MARYLAND LOCAL 561-0200

All of our ribbons are manufactured to

289

160

114

102

127

1310

104

113

109

112

118 169

167

123

114

120

130

1310

137

135

990

135

160

114

156

153

165

187

268 289

163

281

175

226

133 135

991

145

161

195 162

185

188

178

211

198

iBM 5224 Baseball Bat.

IBM 4207 ProPrinter X24

IBM 4208 ProPrinter XL24

IDS Prism Black 132/2080/2132

4.95

5.95

13 06

3.50

320-

Timonium, Meryland 21093

QUALITY SERVICE PRICING

BUY DIRECT FROM THE MANUFACTURER

STOP THROWING AWAY YOUR DOLLARS

We manufecture our products with the finest matrix inks, premium high den-

62285A-Cannon/Hewlett Packard

Laser Jet II Cartridge...

.69.00

69.00

sity nylon, precision engineered plas-Philip E. Boni exceed your original equipment manutics and "Rem" air retrigerated loeding facturars specifications. equipment COLORS . . . BLUE - GREEN - PURPLE - RED (Add \$1.00 To Each Price) Nylon Only

-	CARTRIDGE RIBBONS (NYLON)	No.	Dascription Price (sa.)	No.	Description Price (ea.)
	Description Price (as.)		IDS Prism Primery RD/BL/GR/B9.75		NEC 5500/7700 Spinwriter M/S2.50
3	Alps 2000\$4.50		IDS Prism Process CY/MA/Y/BL9.75		Nekajima Corr3.50
0	Anedex 9500/96003.60	266	Mannesmann Tally 653.95	304-	Nekeiima M/S
0	Apple Imagewriter II 4 color9.95	285	Mennesmann Tally 884.50	334-	Olivetti ET 201/121 Corr3.00
4	Apple Imagewriter/DMP2.95	233	MannasmannTelly1000/1200/1600 2.75	334R	Olivatti ET 121/351 M/S
2	Brother M14094.50	204	Mannesmann Telly 100/120/1603.00	222-	Oume I/Sprint 3/5 M/S1.75
7	Brother M1509/17095.50	205	Mannesmann Tally 130/140/1803.50		- Qume III Quick Load2.40
1D		200	NEC 5500/7700 Nylon Cart2.45	219-	Oume IV Sprint 7.8.9.10.11.12 M/S 2.95
4	Canan A-12004.50	114	NEC 8023 PC/8024 PC/8027 PC2.95	227-	Ricoh 1300/1600 M/S2.95
3	Centronics 150/1522.25	660	NEC Pinwriter P1/P2/P83.60	251-	Wang System 5581/6541 M/S Matrix .2.95
9	Centronica 350/351/352/3538.50	661	NEC Pinwriter P3/P73.95	١.	WIN SPOOL RIBBONS - NYLON
2	Centronics 704/705/7534.50	662	NEC Pinwriter P5 H.D3.95		
В	Citizen LSP 120D4.50	663	NEC P2200 H.D. 5.50		Burroughs 9245/9247 5M15.95
9	Citizan MSP 10/202.50	209	Okidata 162/183/192/193		CDC 100/200/3004.75
7	Citizen MSP 15/253.50	206	Okidata 292		Centronics 100/300/5003.75
3	Comrex 420	208	Okidata 293/294		Data 100/300/4004.75
ŧ	C. Itoh 1550/7500/85102.95	217	Panasonic KXP 1080/1091/10936.90	454-	Decision Data 6807/6811/68146.95
0	Date General LP2 5.75	226	Radio Sheck DMP 400/LPVI2.95		Dec writer LA 30/362.50
,	Data Products M-100L/120/2003.50	235	RadioShackDMP1001,PVII/TRS80,PII 3.95	456-	Dec writer LA 120/1803.50
1D	Data Products 8-300/600	282	Radio Shack/DMP 130 3.75		Facit 4540/4542 Black3.70
7	Data Products B-900/1000	282	Seikosha SP600/1000	462-	IBM 3262/52624.95
5	Data Royal 5000	261	Star Micronics NB/NL/NP/NX 103.60		IBM 3525 T/S3.00
•	Datatrol/LRC MP404.15	264	Star Micronics NL/NP/NX 155.20	463-	IBM 52113.75
5	Data South 160/220/51802.60	268	Star Micronics NX10004.95		IBM 5225/5250/528014.50
•	Dec LA 34/100/210 Letterprinter 2.95	262	Star Micronics Radix 10/SR 10 3.60	470-	Okidata 80, 82, 92, 931.25
4	Dec LA 50	263	Star Micronics Radix 15/SR154.10	471-	Okidata 84,94
3	Diablo 1660/2300 Matrix3.50	290	Star Micronics SD103.75		Printronix 150/300/8004.95
3	Diablo Hytype II Nylon295	291	Ster Micronics SD154.10		Seiko Universal Black/Red1.25
	Epson EX 800/10004.20	135	Telax 287D/287D2	470-	Star Micronics Gemini 10/10X1.25
5	Epson FX/MX/RX 70/80/65	242	Taxas Instruments 850/655		Texas Instruments 800/810/815 2.50
7	Epson FX/MX/RX 100/185/2863.50	243	Taxas Instruments 660/865	456-	Taxas Instruments Omni 8203.50
3	Epson Lq 800/Lq 850 H.D3.50	245	Toshiba P321/P341/P3513.10	401-	Wang 2221/55212.75
•	Epson Lg 1000 H.D450	245	Toshiba P1340/P1350/P1351		WIDE COMPUTER RIBBONS
3	Epson Lg 1500295	135	Tritel2.60		
	Epson Lg 2500 H.D	131D	Univac 0769/0790 4 95	UU569	P-BST 14"x10 yds7.95
5	Epson LX 80/90		CARTRIDGE RIBBONS - FILM	0106F	Burroughs 9246 15"x20 yds15.95
ì	Facit 2301/4512/45142.95		(correctable / multi-strike)		-Control Deta CDC 15"x25 yda18.75
3	Facit 4500/4510/4511/45133.75	200	Brother EM60/100/200 Corr3.50	02588	P-Data Products 2230/2330
5	Facit 4520/4525/4526/4528	307-	Brother HR15/25/35 M/S		15"x15 yda13.75
	Fuiitsu DMPG 9/DX2100-2200 3.95		CPT Rotary 8/9 M/S295		P-Data Products 2400 141/1"x 15 yds 13.75
	Ganeral Electric 300/341/W/I	150.	Diable Hytype II M/S 225	03568	P-Documation 1200 15"x20 yds15.65
3	Hewlatt Packard 260818.65	317-	Diablo Xerox Memorywritar	04588	-Honeywell Pru 1200 17.8"x22 yds18.95
5	Hewlett Packard 2831A		Epson DX 10/20/35 M/S	01068	P-Hitachi 15"x20 yds15.95
1	Honeywell 1500/7023/9104 G.P 2.50		Facit 4560/5000 Corr	U056F	P-IBM 1403/3203/4245 14"x20 yds13.25 P-IBM 3211/Documetion 17"x20 yds. 16.25
1	IBM 3267/3615 SII.Dol.Cup/Loop \$1.80		FM-IRM5218/5219 Displaywriter		
5	IBM 3287/3819 Silver Dol. Cart		M/S OEM11.25	U/58F	P-iBM 4246 w/Imposer Strip
2	IBM 3286 1/2" Harmonica3.00	222.	IBM 8240 M/S		181/2"x20 yds19.50
5	IBM 3776 3/4" Harmonica	6120	EM-IBM Quietwriter N/C 10.65		2-Univac 0770 15"x55 yds38.00
3	IBM 4201 ProPrinter II		IRM Wheelwriter Corr 350	U978F	P-Univac 0776 15%"x20 yds16.50
1	IBM 4202 ProPrinter XL4.50		IBM Wheelprinter M/S 7.90		LASER PRINTER SUPPLIES
	IDM 4007 DesCeleter VO4 4.05		1.00		

2020EM-NEC 2000/3500/8800 Flip M/S.....11.80 "CALL US FOR VOLUME DISCOUNT PRICING ing charge on all ordars under \$50.00 CIRCLE 344 ON READER SERVICE CARD See why corporations such as General Motors, Mobil Oll, AT&T, MCI, Eastman Kodak, the entire U.S. Postal Service and thousands more are now using National Computer 255048" brand products

1.55

IBM Selectric II H.Y. Corr



F&W Communications

F&W WORKSTATIONS - THE ADVANCED USER INTERFACE

THE COMPLEAT GRAPHIC ARTIST

We have the lowest prices in the world on 19-inch cole monitors!
Hitachi CM3719 1024X800
State-of-the-art 1280X1024 Moniterm 19t color
with 2048X2048 virtual display \$1600.0
Mitsubishi 3919 with analog RGB inputs for TV,
and TTL inputs for EGA and CGA \$999.0
Philips 19" monochrome for publishing \$400.0
True VGA (IBM 8514 emulation) 19* color Hitachi monitor.
Fantastic!
Ikegami 14" 16-color monitor for VGA. Rugged and super
bright for mobile operation. Without case \$249.0
Many used 19" color monitors; from \$499.0





F&W has all the equipment and software you need for truly professional publishing, TV editing, and drafting. We offer substantial discounts on all brands of equipment. The workstation at left shows: Houston Instrument DMP 62 plotter; size to 36" X 48".... CALL The monitor is a 19" Hitachi at \$990.00 The digitizer is a Summagraphics 12" X 18" at \$650.00 The console monitor is a Maganvox Multiscan at \$540.00 The computer is a Wyse 386-based system at CALL The furniture is the French-built UNIC workstation at CALL Many other options are available: \$999.00 Sweet-P plotter (HP 7475A compatible 6-pen) \$749.00 Microtek MSF-300G Flatbed Scanner. 300dpi resolution; 256 shade grayscale reproduction \$2750.00 Blaser 2: full range graphics laser printer; excellent blacks . . \$1650.00

Mural Flatbed Plotter; D-size plots at minimum cost \$2195.00

Shown at right is our most exciting new product, the Vision Systems "Vision 16" frame grabber. This hardware and software system captures TV images from a camera, VCR, or camcorder. Because of its 512X480 pixel display. with 16 bits per pixel, extraordinary color rendition and clarity can be achieved. Conversion programs are available for VGA, CGA, and EGA. The "Vision 16" system lists

State-Of-The-Art CRT controller cards from F& W ensure system compatibility: Video 7 VGA, 640X480, 256 color \$249.00

QDP 1000/16, 16 color, 1024X1024 \$649.00 QDP 256 color \$1249.00 Imagraph 1280X1024 with 1 Mcg Videoram,

16 color



ALL MAJOR CREDIT CARDS ACCEPTED

FARADAY & WHEATSTONE COMMUNICATIONS CAD, GRAPHICS & ELECTRONIC PUBLISHING 194 MAIN STREET, MARLBOROUGH MA 01752 USA (617) 485-1144

DISCOUNT WAREHOUSE

OVER \$4,000,000,00 INVENTORY IN STOCK

ALL EPSON **Printers** in Stock for **Immediate Shipment**

ALL EPSON' MODELS READY

Nobody Sells EPSON For Less



FX-850 FX-1050 CALL FOR DETAILS TO SELL AT LOWEST EVER DISCOUNT

EPSON°

Quality computer products that deliver outstanding performance and value at prices only

EPSON



LQ-500

 180 cps in draft mode
 60 cps (12 CPI) in Near Letter Quality mode

Friction and Tractor feed

 Automatic single-sheet loading
 Two resident Letter-quality fonts
 "Shadow" and "Outline" print · Front panel controls

ut-sheet feede LQ software for Microsoft Windows

COMPUTER DISCOUNT WAREHOUSE™ can offer!



LQ-850

264 cps in draft mode 88 cps in Near Letter Quality mode
 6K buffer

 SmartPark paper handling
 Front panel controls Options • Tractor Feed

Cut-sheet feeder
 32K buffer

LQ-1050

264 cps in draft mode 88 cps in Near Letter Quality mode 6K buffer SmartPark paper handling 136 Column carriage

 Front panel controls Options
• Tractor Feed

Cut-sheet feeder
 32K buffer

LQ-2500

324 cps (Elite 12 CPI) in draft mode

405 cps (Elite 15 CPI) in ultra high-106 cps (Elite 12 CPI) in Near Letter Quality mode

· BK buffer . 5 Letter quality fonts

 Front panel controls with LCO display . Single and dual-bin cut-sheet feeders · Color enhancement

EX-800

1 58 M

32K buffer



FX-286e

· 240 cps in draft Elite mode 48 cps in Near Letter Quality mode 8K buffer

136 column Friction and tractor feed

Automatic single-sheet loading Front panel controls IBM ProPrinter character set 32K buffer

. Cut sheet feeder

. Customize for special tasks MOST ORDERS SHIPPED

FX-86e

· 240 cps in draft Elite mode 48 cps in Near Letter Quuality mode
 8K buffer
 San-serif font standard Friction and tractor feed

 Automatic single-sheet loading
 Front panel controls
 IBM ProPrinter character set Options • 32K buffer

· Cut sheet feeder



LX-800 180 cps (12 CPI) in draft mode 30 cps in Near Letter Quality mode Front panel controls

Options
- Color enhancement 32K buffer AUTHORIZED EPSON® DEALER

call us before you bu

WITHIN 48 HOURS

Call CDW for custom quotes

WHY WAIT? CALL COMPUTER DISCOUNT WAREHOUSE™ NOW! Nationwide Toll Free

CDW™ stocks a full of products to support every

(312) 498-1426 (312) FAX

· Pull tractor feed

· Single sheet loading





QUALITY PRODUCTS COMPETITIVE PRICING • PROMPT DELIVERY 24 HOUR ORDER HOTLINE ALL OTHER INQUIRIES (7AM-5PM PST) 415-592-8097 415-592-8121



JE1001 4.77/8MHz (PC/XT) \$ 99.91 JE1002 4.77/10MHz (PC/XT) . . . \$119.91

JE1007 6/8/10/12MHz (AT) \$349.95 C/XT/AT

JE1017 Pictured E1010 Standard PC/XT File-Top Case \$34.95 JE1011 Standard PC/XT Stide Cook ... \$39.95 JE1014 Beby XT Turbo Rip-Top Cook \$69.95 JE1017 Beby Af Pilp-Top Cook \$89.95

JE1018 Baby AT Bade Cose, \$89.95 C/XT/AT

PCAT (150 Well): +5V II 15A, -5V II 05A, +12V II 5.5A, -12V II 05A AT (200 WMR): +5V @ 20A, -5V @ 0 5A, +12V @ 6A -12V @ 0 5A JE1030 Standard Size PC/XT...\$69.95 JE1031 Baby PC/XT....\$69.95 JE1032 Baby AT...\$89.95

OF STREET, STREET, STREET, STREET, JE1019 Propered JE1015 Standard AT Imput (XT/AT) . . \$59.95

JE1018 Enhanced layout (XT/AT) \$79.95 ech 2 and 3 Button Mica Includes driver software Senal or Bue Card Ver-ions available - Fully ompelible w/ all mouse

M8 2-Dutton, Serial Mouse. . . \$49.95 C7PLUS 3-Dutton, Serial Mouse. . . \$89.95 C7BUS 3-Dutton, Sua Mouse. . . \$99.95 RAM, V20 & Intel Math Copro 85,536x1 (150ns) ... 262 144x1 (120ns). 262 144x1 (150ns). (SMHz) V20 Chip (Replaces (SMHz) V20 Chip (Replaces 8085 or 8088-2) 8087-2 PC/XT and ... 5114.85 \$309.95

U.S. Funds Only Shipping: Add 5% plus \$1.50 Insurance May very according to weight) Add 6%, 6½% or 7% Sales Tax FAX's: 415-592-2503 or 415-595-2664

IBM AT COMPATIBLE KIT Mini-286 6/8/10/12MHz Kit ... \$349.95 XT/AT Style Reptoord..... \$ 59.95 JE1015 JE1017 Seby AT Flip-Top Cose. . . . 8 69 95 JE1022 SN' Hi-Daniely Disk Drive . . \$109.95 JE1032 200 Watt Power Rapply. . . . \$ 89.95 JE1043 Controlor Cort. ***** \$ 49.95

JE1085 Input/Output Card...... 8 59.95 Regular List \$789.65 SAVE \$99.70!

JE2009* IBM AT Compatible Kit. \$689.95
JE286M JE2009 Technical Manual. \$29.95
7MM sti included - Minimum RAM conference \$125(18 Chies 41216 120 see left) IBM COMPATIBLE DISPLAY MONITORS

12" Amber Monochro AMBER.....\$99.95

14" RGB Color — CGA Compatible, 640 : tion (PC/XT/AT)

TTX1410.....\$279.95 14" EGA Color - EGA/CGA Compat., 720 x 350 Max. Resolution (PC/XT/AT)

14" Multiscan Color - VGA/PGC/EGA compatible, 800 x 600 Max. Res lution (PC/XY/AT) CTX1435.... EGA/VGA MONITOR AND CARD SPECIALS

14" EGA Monitor and EGA Card - EGA competible, 720 x 350 Max. Resolution - displays up to 16 colors (PC/XT/AT)

13" VGA Monitor and VGA Card - VGA compatible, 800 x 560 Max Resolution - displays up to 256 colors (PC/XT/AT) JAMECO IBM PC/XT/AT COMPATIBLE CARDS

Graphic MGA,
Display L EGA! LEGA! Cards JE1000 JE1050 Mono Graphics Card w/Printer Port (PC/XT/AT).

JE1052 Color Grephics Card w/Printer Port (PC/XT/AT)...... \$49.95 JE1055 EGA Card with 286K Video RAM (PC/XT/AT).....\$169.95
JE1071 MUSI NO with Drive Controller
send Monto Graphics (PC/XT)........\$119.95 Multifunction, I/O and Expansion Cards

RS232 Serial Helf Card (PC/XT/AT).....\$29.95 NO Card with Senal, Game and Parellel Printer Fort (AT). \$59,95

Expand to 384K (zero-K on-board) Multifunc: w/Serial, Game, Parellel Printer Fort & Real Time Clock (PC/XT) . \$89,95 JE1078 (2010) A thi-location (VI).

3/48 of texponded or extended memory, parallel printer port, serial port and game port (2010-K on-board) (AT). loppy and Hard Disk Controller Cards

JE1040 Roppy Disk Drive Controller Card (PC/XT). . . . \$29.95 JE1041 20/40MB Hard Disk Controller Card (PC/XT).....\$79.95 JE1043 360K/720K/1,2MB Floppy Disk Cont. Card (PC/XT/AT) \$49.95 350K/720K/1.2MB Floppy/Hard Disk Controller Cord (AT). JE1045 \$149.95

(yocera 3.5° 20 and 30MB Hard Disk Drives

mounting hardware and installation kill KC20B 35"20MB Drive Only . . . \$299.95 KC30B 3 5" 30MB Drive Only . . . \$349.95

Seagate 20,30 40 and 60MB Half Height Hard Disk



 32 SMB formatted capacity - Saves sparreduces power consumption - Easy Insti Pre-tested and low-level formatted 40MB Tape Back-Up

 Allows unaffended back-up of 40MB in 40 minute - Standard Old data format - Easy to use menu-driven soft-wars - Rit, incremental, 40MB Tape Back-Up. . . .

40M5 Tope Cartridge. Jameco 5.25' PC/XT & AT Compatible Disk Drives

JE1020 380K Black Bit. (PC/XT/AT)...\$ 89.95 JE1021 380K Beige Bit. (PC/XT/AT)...\$ 89.95 JE1022 1.2MB Beige Bit. (PC/XT/AT)...\$ 109.95 3.5" PC/XT/AT Compatible Disk Drives 52KU Select Result and Install MF3558 latton Kit Incl.) (PC/XT/AT). \$149.95

2400/1200/300 Modems Datatronics

Send \$2.00 Postage for a

FREE 1988 CATALOG Talex: 176043 8/88 C1965 Jameso Decrenics 1355 Shoreway Rd., Belmont, CA 94002 • 24 HR. ORDER HOTUNE 415-592-8097 • All Other Inquiries (7am-5pm PST) 415-592-8121

Great Software for your PC - \$2 per disk (Reg. \$6)

We are making this special offer to introduce you to membership in PC-8IG. The World's Largest Source of Low Cost Software for the IBM-PC and compatibles. PC-8IG disks are normally \$6 each fless with membership and come peacked full of Shareveare—software markeded in the recolutionary new way that allows you to try out a program before registering it with the author. PC-8IG provides your gateway to this software with the bimonthly \$FIAREWARE Magazine. Discharged the provider of the provid

membership fee of \$20 (USA).

Some of the advantages of buying from PC-SIG: We are the oldest and largest Shareware vendor. Our disks are the latest versions. Free technical support by phone. Most complete library of Shareware over 1000 disks. 48 hour shipping.



Join PC-SIG and receive 424 page directory, bi-monthly Sharewere Magazine, Hotelheets and special discounts.

Take any disk listed in this ad-\$2 each - when you join today! Offer expires August 31, 1988.

Communications

499 PROCOMM: Extremely versable telecommunications.
 310,1022,1023 G-MODEN: A favorite. Let's your computer talk via pinces.

☐ 212,334,621 RBBS-PC: Set up your own bulletin board. Computer Languages Education

☐ 577, 578 C TUTOR: Learn C language.
☐ 965 PASCAL COMPILER: Full-screen editor, incremental compiler and more.

compiler and more.

254 PC-DOS HELP: Gives you on-line help to remember those DOS commands.

☐ 105 PC-PROFESSOR: Learn beginning BASIC.
☐ 775-778 PSEUDOSAM: Macro assemblers & debuggers for

many popular microprocessors, including 6068-66/2666.

481 STILL RIVER SHELL: Menued DOS commands. Makes the acriter.

403 TUTOR.COM: Learn beginning DOS.

Databases

297,288 FILE EXPRESS: Customize, menu driven data base.

 □ 5, 730, 1015 PC-Fil.E+: The most powerful and popular data base.

 □ 830 WAMPUN: dBase III clone, but easier to use. (Hard disk

(eq) Educational

■ 844 ABC FUN KEYS: For ages 2-5. Teaches the alphabet
☐ 612 FOREIGN LANGUAGES: Beginning Spanish, French, German & Italian.

 □ 229 FUNNELS & BUCKETS: Fun game leaches younger children arithmetic.
 □ 320 PC-TOUCH: Typing later. (Color Reg)

477 WORDGAMES: Structures the intellect.

164, 773 CASHTRAC: Manage checking accounts, track investments.

☐ 151 FINANCE MANAGER It: Double entry bookkeeping ☐ 469,470 MR. BILL: Itemize invoices, age accounts, etc. ☐ 331 PC-GENERAL LEDGER: Written by a top linancial

☐ 575 PC-STOCK: Track & evaluate stock trends. (Color reg)

GEITTES 452 AMULET OF YENDOR: Hack, a dungsons & dragons adventure germe.

☐ 708 BACKGAMMON: You against the computer. Also, Wheel of Fortune

☐ 780 BRIDGE PAL: Computer plays 3 hands. ☐ 228 CRIBBAGE: And a few other games as well. 1 1457 GREATEST ARCADE GAMES: Flightnare, Jump Joe. Spaceway (Color req.)

1 1476 PATRICK'S BEST GAMES: Bugs Cerepede, 3-D Packman, Castle, Packgal, Spacevad.

[1557 PINBALL RALLY: 3 great games of dextertly and speed. (Color req.) [1120 PC-CHESS: Your move...

| 1791 POKER: Play draw poker head to head. Or try some Blackjack. | 1694 SLEUTH: A murder has been committed .

197 TWO TREKS: Beam me up. Scottle! 891 WHEEL OF MISFORTUNE: Spin the wheel, win or go banksor!

Graphics

(Nost require CGA or EGA Card)
701-704 DANCAD 3D (4 disks): Create and animate 3d drawings. (Hard disk req)

| 1826 EDRAW: Draw flowcharts, schematics, even printed criculal | 1763 FINGER PAINT: A 3d wire frame modeling program.

(Runs also with Hercules Card.)

[] 870 HGC/BM: Run color graphics programs with your Hercules Card!

| | 786 MAGE 3-D (EGA ver.): Create, view, edit 3d objects.
| 762 MAGE 3-D (CGA ver.)
| 1001 MAC PASTE: Read, save, edit and print Readmac or

Mac Paint pictures.
[_] 344,345,1032 PC-KEYDRAW: Graphics and "slidsshow" presentations.

| 361, 632 FAMILY HISTORY: Trace your family tree.
| 929 LOTTO: Will this really help you win the lottery?
| 395 HOME INVENTORY: Keep track of everything you own

MUSIC

127 PC-MUSICIAN: Compose and play your song.
1279 PIANOMAN: Plays your music or its own in chord

Office

| 608 AUTOMENU: Create easy access menus for your hard

☐ 824 DESK COMMANDO: Tools to tame your hard drive.
☐ 1404 EZ-FORMS: Create your own business forms.
☐ JSBS FORM LETTERS: Variety of business letter formats.

J483 MAILMONSTER: Add, edd, sort and print labels by categories.

1465 PC-DESK TEAM: In memory calculator, calendar, shone dealer, alarm & more!

Printers
1517 MAGE PRINT: Letter quality from your dot matrix.

[| 716 LQ PRINTER: Print tancy forts on your dot marks. L | \$23 SIDEWRITER: Print barners or wide spreadsheets. CIRCLE 145 ON READER SERVICE CARD. | 1974 BIBLE CUIZ PLUS: Learn the Bible trivia come

[] 766-772 THE BIBLE (7 disks): King James version. ! ISS1, 582 WORD WORKER: Performs text searches of words in the Bible.

Security Hacking | 598 MASTER KEY: Like Norton Utilities. Recover lost files,

etc.
| 1414 UNPROTECT/PROTECT: Copy a venety of copy

Protected disks.

Spreadsheets

1 | 524,525 EXPRESS CALC: Powerful but friendly spreadsheet.

☐ 199,1016,1017 PC-CALC: Like Lotus 1-2-3 but easi
Word Processing

☐ 719 LETTER WRITER: Print out "personalized" letters.
☐ 528 NEW YORK WORD: Allows split screen, mail merge &

| | 460 PC-OUTLINE: Like ThinkTank, Organize your ideas & thoughts.

[|455,681,682 PC-TYPE: Jim Button's own word processor. Has it al.

L 178, 627 PC-WRITE: Powerful, multi featured, spelling checker, laser support

Please send the disks I have checked above.

1 year PC-SIG Membership = \$20,00
3 10" add \$1 per disk
PREE Shipper gand Hendling
Amount enclosed

By: | | Check | | Vise | | | MC
Card No.____

Exp.____Sig.___

Cey:_____Sate___Zo__ PCSIG PC-SIG



Order By Phone:

Order By Phone: 800/245-6717

(In Calif. 800/222-2996)

Arlington Computer Products gives you the best prices on IBM PCs...

IBM AT

1.2 Floopy, 512K 40 MB Hard Disk w/Monochrome Monitor ... \$3295 w/Color Monitor . .

IBM XT

CALL FOR CUSTOM CONFIGURATIONS

IRM PERSONAL SYSTEM II

Model 30, 2 floppies w/Monitor \$1475	Model 60, w/44 MB & Monitor . \$3595
Model 30, w/20 MB & Monitor . \$1899	Model 60, w/70 MB & Monitor . \$3995
Model 50, w/20 MB & Monitor . \$2875	Model 80, w/44 MB & Monitor . \$4595
Model 50, w/30 MB & Monitor . \$3199	Model 80, w/70 MB & Monitor . \$5249
Model 50, w/60 MB & Monitor . \$3699	Model 80, w/115 MB & Monitor \$7995

w/Color Monitor add \$250

and COMPAQ too!

COMPAQ 286

DESKTOP — 1 Drive 640K, 40 MB, Monitor	\$2495
PORTABLE II MODEL IV — 1 Drive 640K, 20 MB	\$2799
PORTABLE III — 1 Drive 640K, 20 MB	\$3649
w/40 MB	\$4175

COMPAQ DESK PRO

1 Drive, 640K, 20 MB reen or Amber Monitor

Ext. 51/2" for PSII

BOK Floory for Do

COMPAG 386

	_		_	_	_
Model	40 (16	MHZ)			\$419
Model	w/60 I	MB-20	MHZ .		\$549
Model	w/130	MB-20	MHZ		\$684
Model	w/300	MB-20	MHZ		. \$919

COMPAQ PORT, 386

		=						-	-			
Model	40				:							\$5699
Model	100											\$7195

AST PREMIUM 286

10 MHZ, 512K, 1 floppy, 40 MB, monitor

\$2199

PACKARD BELL or SAMSUNG

310A

XT Turbo, 512K, 1 drive, DOS, S/P/C, 20 MB, monitor \$1049

DRIVES & TAPES .. \$259

\$1695

360K Floppy for AT \$115	30 MB for XT (ST238), \$299
20 MB Tape \$339	40 MB for AT (ST251), \$369
40 MB Tape for AT	40 MB for AT (ST251-1)\$479
or Compaq 386 \$459	80 MB for AT \$749
EVEREX	PRIAM HARD DISKS
60 MB Internal \$679	40 MB \$679
60 MB External \$679	60 MB \$819
	130 MB \$1999
IOM	EGA
10 + 10 Bernoulli w/Controlle	r\$1489
20 + 20 Bernoulli w/Controlle	r\$1829

Bernoulli Box II 51/4" 20 MB Int. \$799 Hard Card 20 MB \$539 Hard Card 40 MB \$699

SEAGATE HARD DISKS

20 MR for YT (ST225) \$279

VIDEO BOARDS ATI EGA Wonder ... \$189 ATI VIP VGA \$269 Compag VGA

Everex EGA Autoswitch	
Hercules Graphics Plus	\$179
NEC GB1	\$199
Orchid VGA	
Paradise Autoswitch 480 .	\$169
Paradise VGA	\$259
Paradise Professional	\$399
Quadram Prosync	\$209
Vega VGA	\$289
MICE &	

PLOTTERS

PLUTTERS							
Mouse Systems \$99							
Microsoft \$109							
Logitech \$74							
Summasketch 12x12 \$389							
12x18 \$689							
HP7440 \$989							
LIDTAAS \$1440							

MONITORS AMDEK \$129 600

\$349

410/4 0140	722 9400
PRINC	
HX12E	\$449
Ultrasync	\$529
IB	
8502 \$199	8513 \$519
8512 \$449	8514\$1150
, N	FC.
Multisync II	\$579
Multisync Plus.	
19" XL	1999
GS	\$189

SAMSUNG Color \$259

EGA \$359 SONY Multiscan . . . \$599 ZENITH 1490 \$699

Arlington omputer Products inc



FOR ORDERS & SYSTEMS QUOTES:

00-548-5105

CUSTOMER SERVICE AND IN ILLINOIS 312-228-6333 SHIPPING 312-228-6333 TECHNICAL ASSISTANCE 312-228-1470

FAX 312-228-0516 Prices and Availability Subject To Change Without Notice

Bringing you the best in IBM compatible peripheral since 1984.

OUR EPSON PRINTER PRODUCTS ARE SO GOOD WE NEED TO SHOW THEM OFF

\$189	FX 850 \$339	FX 86E \$299	LQ 500 \$329	LQ 1050 \$719
EX 800	FX1050	FX 286E	LQ 850	LQ 2500
\$419	\$489	\$419	\$519	\$809

100	A STATE OF THE PARTY OF THE PAR	CALL AND	Market 1
	PRIN	TERS	
EPS	SON	N	EC
LX 800 \$189	FX 286E \$419	P5200 \$549	P5300\$699
EX 800 \$419	LQ 500 \$329	3550 \$729	P9XL \$1049
	LQ 850 \$519	P5XL \$859	
FX 1050 \$489	LQ 1050 \$719		
FX 86E \$299	LQ 2500 \$809	TOS	HIBA
OKI	DATA	321 S/L \$499	341 S/L \$659
192 Plus \$339	ML 320 \$339	351 SX \$1010	Laser \$2649
	ML 321 \$469	*****	SONIC
292 \$449	ML 390 \$469	1080 1 \$189	
	ML 391 \$829		1592 \$405
393	\$929		
Lasar Line 6	\$1389	16	M
HEWLETT-	PACKARD	Quietwriter III	\$1149
Laserjet II	\$1699	Proprinter II	\$389
1 MG Upgrade	\$339	Proprinter X24	\$549
2 MG Upgrade	\$629	Proprinter XL	\$549
4 MG Ungrade	\$1099	Proprinter YI 24	\$700

SOFTWARE	
D Base III Plus	. \$379
Framework	
IBM Displaywrite IV	
Lotus 123	
Managing Your Money	. \$125
Microsoft Word	. \$219
Microsoft Excal	
Multimate Adv. II	. \$259
R Base for DOS	. \$439
Smartcom	\$49
Symphony	. \$429
Vantura Desktop Publ	. \$499
Word Perfect 5.0	. \$219
Wordstar 2000+	. \$239

MODEMS &

Hayes 1200/1200B\$289
Hayes 2400/2400B \$429
Everex 300/1200 w/Software \$99
Everax 2400 Internal \$179
Everex 2400 External\$249
Sharp FO-300\$1219
Sharp FO-500 \$1689

CHIPS

	64K																	
	2561																	
	8087																	
	8087																	
į	8028	17 .														\$	15	9
	8028	7-	8N	tH.	z											\$	24	9
	8028																	
	8038																	
	9025																	

AULTIFUNCTION

DUANDS
Everex Magicard 384K \$169
AST 6 Pack w/384K \$239
AST 8 Pack Premium w/256K \$219
AST Advantage\$259
AST Rampage PC w/64K\$239
AST Rampage AT w/512K \$399
Orchid Tiny Turbo \$279
Intal Above Board PC\$239
Intal Above Board AT \$329
Intel PC 386
Irma Board \$895
AST 5251-11\$529
AST 5251-11 Plus Enhanced \$599

* ISSUE HIGHLIGHTS *

- 2	AST RAMPAGE AT W/2 MEGABYTES \$999	NEC MULTISYNC MONITOR \$579	MICROSOFT MOUSE \$109	NEC MULTISPEED HD \$2299	EPSON PRINTER STAND W/PRINTER PURCHASE \$15
١	EXTERNAL 51/4" FOR PSII \$250	SEAGATE 30MB HARD DISK KIT \$200	HP LASERJET II \$1600	NEC MULTISPEED EL \$1500	D BASE III

800-548-5105

Arlington omputer roducts, inc.

LINGTON HEIGHTS, IL 60005 Prices and Availability Subject To Change Without N



SAVE MONEY ON COMPUTERS

OMPUTER PRODUCTS AT THE LOWEST PRICES WE ARE YOUR NETWORKING SPECIALIST.

COMPUTERS		MODEL 2112-40 MODEL 2200-01	PRICING	NOVELL NETWORKII		ARCNET AT	\$359.00
THE ALL REWIRM PERSONAL SYSTEM 2		MODEL 2200-01 MODEL 2200-20	STOCK	TURNKEY NETWORK SYSTE	M	ETHERMET	\$259.00
DOEL 25 MONOCHROME LELCEPTY	\$1,045.00	MODEL 2214	RUCK	10MHz 286 FILE SERVER, ARCNET PC		ETHERLINK PLUS AT	\$699 00
IDDEL 25 MONDOHROME 2 PLOPPIES		MODEL 2114-40	WYSE	TERMINALS, LOADED SOFTWARE,		MICROCHAMNEL CARDS PS/2	\$399.00
NODEL 25 COLOR 1 FLOPPY	\$1 339 00		DEALER	CABLES, TERMINATORS AND TEES.		WORK STATIONS	
HODEL 25 COLDR 2 PLOPPES	\$1,499.00	MODEL 3015-40	CALL	EVERYTHING PLUG IN & TURN ON	\$6,999.00	ARCNET PC TERMINAL	\$799.00
MODEL 30-002 (2 729K FLOPPIES) MODEL 30-021 (20AMB HARD DRIVE)	\$1,259.00	AT STYLE ENHANCED KEYBOARD	\$109 00	4-USER (40MB) 6-USER (80MB)	\$6,999.00 \$8,999.00	ETHERWET PC TERMINAL	\$799.00
#GDEL 30-(21 (20MB HARD DRIVE)	\$1 699 00	TERROHALE		8-USER (ROMB) 8-USER (ROMB)	\$10,999.00	MISC. METWORKING ITEMS	
OZBE SYSTEMS		MODEL 30 GREEN OR AMBER	\$299 00	OPERATING SYSTEMS	\$10,999.00	ARCHIVE FISO EXT TAPE BACKUP	\$899.00
KODEL 50-001 (20MB HAVID DRIVE)	\$2 609 00 \$3 339 00	MODEL SO GREEN OR AMBER	\$369 00			ADDITL CONT. CARDS FOR ARCHIVE MOUNTAIN 400ML TAPE BACKUP	199.00 \$469.00
DOEL 80-041 EWI MODEL 70'S	IN STOCK	MODEL SO GREEN, AMBER OR WHITE	\$309.00	MEW1 ADV. NETWARE 286 V2.11 ADV. NETWARE 286 V2.1 SET	\$1,999.00	WANGTEX GOMB TAPE BACKUP (INT)	\$649.00
KODEL 80-041	\$4 399.00	MODEL 85 GREEN OR AMBER MODEL 80 KEYBOARD	\$100.00	ADV NETWARE 286 V 2 DA	\$1,499.00	ANCNET ACTIVE HUS	\$499.00
100EL 80-071	\$5,596,00	*** LASER XT AND ESI 286 SPECIA	3100 00	ADV NETWARE 286 SET I	\$7 096 50	ARCNET PASSIVE HUB	\$85.00
IM PERSONAL SYSTEM 2 DISPLAYS		NATIONALLY RENOWNED LASER XT	\$499 00	ELS 4-USER SOFTWARE	\$429.00	ELGAR MONITOR 1000 WATT UPS	\$899.00
ONOCHROME MIGI	\$189.00	W256K, 1 RLOPPY	2499 00	CAFOS	P47.00	WISOFTWARE	
0L0R-85/2 (14")	\$432.00	LASER XT W/640K, 2 FLOPPIES,	\$799.00	ARCNET POXT	\$169.00	APC MONITOR 1000 WIGT UPS	\$1,199.00
3LOR (6513 (12°)	\$498.00		2177 00	ANDRE FOR	2793.00		
DLDR 8514 (MC)	\$1 150 00	MONTOR MONOGRAPHICS BOARD.			_		
EW PERSONAL SYSTEM 2 SOFTWARE		TURBO TO MAY MOTHERBOARD		SPECIALI FLUITSU 360K 1/2 HGT FLOPF	Y \$69.00	FAX MACHINES	
M D0533	\$90.00	SPECIALI SSI AT 286-10, 5124.	\$1,119.00	COMPNO 360X FULL HET FLOPPY	\$47.00	SHARP FO-300	\$1,220
OMPAQ "		1 2MB FLOPPY HO FO CONTROLLER		TOXAN TOM-S 5 25" EXTERNAL FOO FOR IBM PS 2	\$239 00	SHAPP FO-500	\$1,649
ESKPRO 286 MODEL I	\$1,889 00	AT STICE KEYBOARD & EXPRASSION		PUR ISM POY	\$1,395.00	CANON FAXIFICANT B	\$995
	\$2,579.00	SLOTS, 195 WATT POWER SUPPLY RULL 1 YEAR WARRANTY		SERNOULLI BOX 10 + 10 SPECIALI BERMOULLI BOX 20 + 20	\$1,599.00		
	\$2,999.00	NEW PACKARD BELL WINATIONWIDE 1 Y	AR PERMIT	NON BOOTABLE CONTROLLER	\$159.00	HAYES SMARTINGGEN 2400 EXTERNAL	142
SKFRC S86 W 40M8 HARD ORIVE	\$4,560.00	PRISO XT TURBO 512X	\$639.00	BOOTABLE CONTROLLER	209 00	MO SOFTWARE	. 142
ESKPRO 386 MODEL 80, 20MHz ESKPRO 386 MODEL 130, 20MHz	\$7 629.26	1 360K FLOPPY, DOS. GW-BASIC.	ao.59 00	SPECIALI IRWIN 10MB TAPE BACK-UP IRWIN 20MB AND 40MB INTERNAL		HAYES SMARTMODEM 24008	542
ESKPRO SVE MODEL 300, 20MHz	59 159 00	SER PAR. COLOR MONO AGAPTER.		IRWW 2048 AND 4048 INTERNAL	IN STOCK	WISOFTHARE	-
" NEW COMPAC POSTABLE III ""	IN STOCK	CLK/CAL, AT STYLE KEYBOARD		TAPE BACK-UPS	5330 m	HAYES SMAKEHOOSEN 2400B INTERNA	L \$37
MOEX			\$1,289.00	ARCHIVE 45MB TAPE BACK-UP LINIT FOR KEINT	2238 00	HARDWARE DILY EXTERNAL MODEM CABLES	
#EREX 286/10 SUK 1 2M FLOPPY	\$1.079.00	VT286 (AT COMPATIBLE) 10 MHz	\$1,289.00			EXTERNAL MODEM CABLES	\$10
512X ENHANCED KEYBOARD	\$1,01300	O WALT STATE 640K, 1 2MB		CARDS		IBM 5250 EMUL 2 12 CONV KIT	\$63
IEREX 386/15 1MB, 12M RUPPY	\$1.795.00	FLOPPY SERTING FOYO		SPECIALI MULTI I/O MONOCHROME GRAPHICS W PP	\$50.00	PRINTERS W/ FREE CA	RIF
ENHANCED KEYBOARD		CONTROLLER, ENH KEYBOARD		MOVOCHROME GRAPHICS WIPP	989 55	IEM PROPRINTER II	\$43
NYSE COMPUTERS AND TERMINALS		AET SPECIALS		HERCULES GRAPHICS CARD PLUS	\$179.00	IEM PROPRINTER XL24	579
100E, 2108	CALL	AST MODEL 80/90/120/140/170	CALL	ISM MONOCHROME W PP	\$197 00		\$1.70
ADDEL 2109-20	for	AST MODEL 300, 340 & 390	CALL	COLOR GRAPHICS DARD COLOR GRAPHICS DARD WIPP	\$89.00 \$89.00	EPSON LX-800 WITRACTOR FEED	\$215
ADDEL 2112	NEW			HERCULES COLOR CARD W PP	\$146.00	EPSON FX-86E	\$315
				NEW HERCULES INCOLOR CARD	\$249.00	EPSON FX-296E	\$439
APTOP COMPUTERS		NEWS TOSHIBA 5100	\$4,800.00	FGA AND MEMORY C	ADDO	EPSON EX 800 EPSON LO 500	\$455
			\$4,800.00		AUD2	FPSON LQ 500 FPSON LQ 850	\$3.6
EC MALTISPEED (12, BACKLIT	\$1 449 00	ZENITH LAPTOP COMPUTERS		EPIC 480 EGA, CGA, MOA, HERC, 640 X 480 VIDED 7 COMPATIBLE	\$149.00	EPSON LO 1050	\$78
EC MULTISPEED HD	\$2 279.00	ZENITH SUPERSPORT MODEL 2	\$1,679.30	PARADISE AUTOSWITCH EGA 640 X 480	\$177.00	EPSDN LD 2500	\$89
DSHIBA 1000 IN STOCK DSHIBA 1200	\$789.00 \$2.237.00	8088, 840K, 2.3.5° FDD	\$2,519.30	WIDED 7 VEGA CITLURE	\$239.00	SPECIAL I NEC P2200	\$33
	\$1,625.00	ZENTH SUPERSPORT MODE, 20 8068-640K-1-3-5*FDD-6-20MB	26,218,36			NEW! MODEL NEC PS200	
EWI TOSHIBA 1200 F IMB RAM	\$1,665.00	ZEN TH SUPERSPORT 286 MODEL 20	\$3,499.30	SPECIALI NEW GENCA SUPER EGA	\$215 00	HEW! MODEL NEC P5300	
2FOO, SUPERTWIST YORNA 2003-20	\$2,979.00	80286, 1MB RAM 20 MB 1 3 5"	80,499 (0)	HI-RES 800 x 600 RESOLUTION		NEC P560 XI, NEC P560 VI	\$8.7
	\$2,009.00	21 N TH 183 - 640K, 13 5" FOD, 20MB	\$1,999.00	ATI WONDERBOARD, EGA, VGA, CGA GENDA VGA \$100 800 X 800	\$199.00	NEC 3550 SPINWRITER	91,00
WYTOSHIBA 3200	23:004:00	21/91/11 163 - 94(K, 13 5" TUU, 20/46	21 399 00	GENDA SUPER VGA 1024 X 788	SAVE		
				NEC NNA 1024	\$799.00	PANASONIC 1000 PANASONIC 1091	\$12
ONOCHROME MONIT	ORS	MAGAMACK EGA	\$385.00	NEC MAN NOT EMPLANCED	\$999.00		\$21
ITE MONITOR THE SWIVEL	\$85.00	SAMSLING EGA MONITOR	\$389.00	VIDED 7 VIGA		PANASONIC ICX P1595	-
SPEEN DRAMBER	ad5 00	SPECIAL! GOLDSTAR EGA MONITOR	\$359.00	DRICHID DESIGNER VGA	\$309.00	DESTINY LASER X1 H-P COMPAJ	\$1,58
CKARD BELL AMBER DR GREEN	\$79.99		\$539.00	PANADOSE VGA CARD 640 X 480 PANADOSE VGA PROFESSIONAL	\$296 00	4 MONTHS FREE SERVICE WITHW OKLOATA MIL 182 PLUS FOR 18M	\$7.6
	\$119.00	COMPROVED MONITOR NEW I NEC MULTISYNC II	\$524.25 \$579.00	PATACISE VSA PROFESSIONAL	CALL	OKIDATA MIL 192 PLUS FOR IBM OKIDATA MIL 192 PLUS FOR IBM	\$24 \$30
IDEX 41DA AMBER MONOCHROME	\$149.00	NEW I NEC MULTISYNC II NEC MULTISYNC PLUS 14" 960 x 720	\$879.00	AST VIGA CARD ATT VIGA VIP CARD	\$314 50 \$307 00	OKIDATA MILTEZ PLUS FOR IBM OKIDATA MILTED FLUS FOR IBM	\$20 \$44
YSE SIX GREEN DR AMBER	\$175.36		\$1,939.00	ATI VIGA VIP CARD COMPAD VIGA BOARD	\$307.00 \$439.00		
MPAG MONOCHEDME MONTOR	\$191.00		3689.00	COMPAN NON BOARD	8439 00	OKIDADA MIL 2925	\$51
C MONOGRAPH	\$1,279.00	SONY MULTISCAN MODEL 1302	\$649.00	MODEMS		INTERFACE MODULE FOR 292-293	\$5
VSE 700 1280 X 800 RES W/GRAPHICS CARD	\$699.00	DISK DRIVES		PACKARD BELL 2400 BAUD INTERNAL	\$199.00	SPECIALI CICIOATA MIL393 PISERIAL OKEDATA ANLSOO IBM	254 \$36
T DISPLAY MONOCHEOME	\$179.50		\$299.00	PACKETA W. (1900 COAR, COSTINA DE	\$100.00	OKESATA MCSOO IBM	\$36
MONITOR 14" BLACK & WINTE	a1/9 30	SEAGATE ST225 20MB W CONT SEAGATE ST236 30MB W FILL CONT	\$309.00	MODEM W. (PRO COM) SOFTWARE PREXARD BELL 2400 BAUD EXTERNAL	\$199.00	DRICKER MUSCLE BM	\$47
		SEASATE ST250 JUMB WHILL CONT SEASATE ST251 40MB 1/2 HBIGHT - AT	\$309.00	USR SPORTSTER 1200 EXTERNAL	\$128.00	OKICATA MU390 IBM	\$47 \$64
OLOR MONITORS		SEAGATE ST251-1 40MB 1/2 HT 28 MLS	\$499.00	USR SPORTSTER 1200 HALF INTERNAL	\$108.00		\$45
MISUNG COLOR 646 X 200	\$259.00		\$359.00		\$199.00	NEW! TOSHIBA POD! SI, W/TRACTOR TOSHIBA POA! SI.	\$45 \$63
SELAL I MAGNAVOX COLOR MONITOR	\$259.00	SPECIAL! SEAGATE ST4096 BOMB	\$699.00	WISOFTWARE EVEREY 1200BAUKI INTERNAL		TOSHIBA P3S1 SX W/TRACTOR	\$90
	\$299.50				\$109.00	HP LASERUET SERIES II	
AGE COLOR MONITOR	\$289.00	MN SCREE 2088 3 5" WWD #8425	\$299.00	EVEREX 2400BAUD INTERNAL	\$199 00	HP DESKUET INCLET PRINTER	\$60
	\$339.00	MINISCRIBE 3675F-2072 60MB.	\$450.00	EVEREX 24000MUD EXTERNAL	\$209.00		
PECIAL! ANDEX COLOR 6001							
ADEK COLOR 722 .	\$444.00	12 HT FOR XT W CONT		NEW LOWER PRICING AVAILABLE		DICONIX 150P BY KDOAK BATTERY	\$30
MDEK COLOR 722 . I COLOR MONITOR	\$289.00	12 HT FOR XT W CONT 29MB MINISCRIBE HARD DISK CARD	00 9902	NEW LOWER PRICING AVAILABLE HAVES SMARTMODEM 1200 EXTERNAL	\$299.00	DICONIX 150P BY KUDAK BATTERY POWERED POPUNE PRINTER	\$30
IDEK COLOR 722 .	\$289.00	12 HT FOR XTW CONT 20MB MINISCRIBE HARD DISK CARD 30MB MINISCRIBE HARD DISK CARD SPECIAL LADME 1/2 HIT MINISCRIBE	\$419 00 \$419 00 \$250 00	NEW LOWER PRICING AVAILABLE HAVES SANRIMODEM 1200 EXTERNAL HAVES SANDOOS W SANATOOM II HAVES SANATONODEM 12006 W HW	\$299.00 \$299.00 \$250.00	DICONIX 150P BY KDOAK BATTERY	\$3 \$5

AUTHORIZED WYSE DEALER » ALL SOFTWARE WINNIUM 30% OFF » MOST CROBERS SHIPPED WITHIN 49 HOURS » WE HAVE THE LOWEST PRICE, CALL US REFORE YOU BLY'NT HAVYHERE ELSE » CORPORATE BIOS OR HINDHOULDE BIOS WICKOME CALL (800) 426-2484, NO ASK FOR AMY TECH HOT LIKE (312) 537-3970 » TOLL FREE CORDER LIKE (800) 426-2489 . WE HAVE ALL YOUN COMPUTED REEDS AT THE BEST PRICE AND WE GUARANTEE IT!

1-800-426-2489

312-537-3600

(312) 537-2850

PCM0888







Low power drives mean less strain on the power supply lower

operating temperatures, and longer component life FREE SOFTWARE including Take Two, the backup utility PC MAGAZINE Editor's Choice in 1986 & 1987, & PC KWIK disk cache software fr om Multisoft 30MB

> \$339 \$389 \$449 \$549

TANDY 1000/A/SX/TX Leprecards add \$20

3.5" Floppy

instant Janton & DS/2 compatibility drive bay, black & grey face places. Now included TakeTwo, the backup utility PC MAGAZINE named as their

\$139 720K internal for 1 44 MB Internal PC/XT/AT Requires for AT only includes DOS 32 or optional driver software

\$199 1 44MB internal for PC/XT Includes high speed floppy Controller & cables Supports two driver

PC/XT Disk Kits

• Pretested • Western

\$299

 50 page instalate quide & reference Cables, mounting screws

full & haif-height face planes TakeTwo backup software, PC MACAGNE "Editor's Choice"

.PC KWIK disk cache software by Multisoft •1 year Warranty 30 day Money Back Guarantee Optional: 150 watt, UL/FCC approved. power supply for BM PCs \$69 TANDY 1000 kits add \$20

20MB kit \$289 30MR kit \$309 agate ST238 32 7MB/65ms/Half-Height/14 8 watts

\$459 40MR kit Seagate \$7251.42.8MB/Half-Height/11 watts pre-formatted into a pair of 21MB/28ms partition

\$549 ove-formatted into a pair of 32MB/29ms partitions

28610 Computer

\$649

80296 processor at running at 6/10 Mhz with 0 wait states provides a Norton SI rating of 115 8 slots Room for 1 full height and 3 haif - height drives 200 watt power supply - Clock calendar - Choice

of 12 or 1.44MB floppy drive - Combination Hard Disk/Roopy drive controller - Maxiswitch 84 or 101 key Keyboard - 512K RAM standard expandable to 1 MR - Award BIOS - 1 year warranty - 30 day money back quarantee

Complete Systems with Serial/Parallel/Game Ports. Orchid 512K VGA & Multisync II

Monographics Card & Monitor \$1095 \$1289 with 20MB/65ms Seagate with 20MB/65ms Seagate

with 40MB/40ms Seagate \$1429 with 69MB/40ms Seagate \$1549

1.5 MB Laser Printer

"One of the Laserjet's strongest INFOWORLD October 5, 1987 512K RAM 1.5MB RAM

\$1295 ◆100% HP Laserjet, & Laserjet + compatible •1 5MB RAM Gives Rull Page 300dpi graphics

. Serial & Parallel Interfaces Vector graphics capability improves speed on programs like Autocad up to 93% 9 resident & 5 downloadable soft fonts standard

\$1995 \$2189 with 40MB/40ms Seagate \$2329 with FSMR/IOms Spanato



•120 day TRW on site maintenance •1 year Warranty Options All HP style font cartridges Toner Cartridge \$29

AT Hard Disk Kits

SpeedStor or OnTrack large drive software
 Formatted, Purbloaded & Testad

Sengate ST251 2222 Seagate ST251-1 HH \$489 Sengare ST4096 Micropolis 1555 Micropolis 1335 Maxtor 1140 \$1569

Orchid 512K \$299 256K \$249

Tiny Turbo 286 \$289 Twin Turbo \$409

1200 Modem

•300 or

speed

1200 bos

Smartcom II

compatible

auto redal

●lina/by cy detect



To order, or get our free catalog, call: Toll Free

800-722-AT-XT MMC

California 805-373-7847

* No extra for Visa/MasterCard (AMEX add 3%).

* Prices include UPS surface shipping * Federal Express shipping just \$1.50 per pound * 30 Day Money Back Guarantee * Corporate & institutional PO's accepted.

•FREE MIRROR II software Made in USA, 1 year warranty

2400 MNP Modems \$239/\$229

 Hayes Compatible, 300/1200/2400 MNP level 4 error correction • FREE MIRROR II Software, a \$69 value

einternal model \$229 fits in short sint Internal with MIRROR II (non MNP) \$119

CIRCLE IM ON READER SERVICE CARD

OR Microdevices Complete customer satisfaction

quality merchandise...providing the best values in leading edge technological



1/2 HEIGHT DRIVES 20 MB, 65 MS, ST-225 WITH MCT-HDC CONTROLLER

\$259.00 WITH MCT-AT FH CONTROLLER \$339.00 30 MB RLL, 65 MS, 5T-238 \$249.00 \$299.00 WITH MCT-RLL CONTROLLER WITH MCT-AT FH-RLL CONTROLLER \$359.00 40 MB, 40 MS, 5T-251 WITH MCT-HDC CONTROLLER WITH MCT-AT FH CONTROLLER \$429.00 \$469.00 \$539.00 4400 00



INTERFACE CARDS FROM MOOULAR CIRCUIT TECHNOLOGY DISPLAY ADAPTORS

HONOCHROME GRAPHICS CARD \$59.95 ■ PARALLEL PRINTER PORT CONFIGURES AS CPT1 OR USES VLSI CHIPS TO ENSURE RELIABILITY MCT MCB ENHANCED GRAPHICS ADAPTOR \$149.95

00" BM COMPATIBLE PASSES IBM EGA DIAGNOSTII 258K OF VIDEO RAM ALLOWS 640 X 350 IN 16 OF 64 COLOR SRAPHICS ADAPTOR 649.95 SUPPORTS RGB: COLOR & COMPOSITE MONOCHRON
 640 230 X 200 RESOLUTION: LIGHT PEN INTERFACE
 MCT-CG

MULTIFUNCTION CAROS

MONDGRAPHICS MULTI NO \$119.75 . CTRL 2 FLOPPY S SERIAL PARALLEL GAME PO! MULTI DO FLOPPY CONTROLLER \$79.95 UPPORTS UP TO 2 360K FLOPPIES 726K WITH DOS 3 2 ERIAL PARALLEL GAME PORT CLOOK CALENDAR CT-MIQ IO-SERIAL -- 2ND SERIAL PORT 515.05 \$59.95 MULTI I/O CARO RAMINIMUM OF SLOTS SERIAL PORT CLOCK CALENDAR WITH BATTERY BACK.

IP # PARALLEL PRINTER PORT ADDRESSABLE AS LPT1

MCTIO AT MLL TIFUNCTION CARD \$139.95 \$29.95

MCT-ATMF-MC PIGGYBACK BOARD ATMF SERIAL-2ND SERIAL PORT

\$59.95 AT MULTI NO CARO MCT-ATIO ATIO-SERIAL — 2ND SERIAL PORT 524.95 MEMORY CARDS

576K RAM CARO 459.95 & 256K RAM CHIPS (ZERD K INSTALLED) EXPANDED MEMORY CARD \$129.95 MONTH

Z MB DE CUT OS INTEL MICROSCO E COMMATIBLE MEMORY FOR AN XT & CONFORMS TO LOTUS INTEL EMS & USER EXPANDALLE TO 2 MB & CAN BE USED AS EXPANDED OR CONVENTIONAL MEMORY RAMDISK AND SPOOLER MCT-ATEMS MCT-ATEMS-AT VERSION

ORIVE CONTROLLERS I.2 MB FLOPPY CONTROLLER #69.95 DRIVES BOTH MAY BE SHOK OR 1 2 MB MCT-FDC-1.2 RLL DISK CONTROLLER \$119.95

RLL HARD DISK CONTROL FOR YOUR XT COMPATIBLE

SUPPORTS UP TO TWO RLL HARD DRIVES

IMPROVES DATA STORAGE SPEED AND EFFICIENCY MCT-RLL ATEN CONTROLLED \$149.95 FLOPPY HARD DISK CONTROL IN A TRUE AT DESIGN SUPPORTS UP TO 2 360K 725K 1 2MB FDD S AS WELL
 AS 2 HDD S USING STANDARD CONTROL TABLES

RLL ATFH DISK CONTROLLER \$199.95
INPROVE SEED AND STORAGE OF YOUR AT
COMPATIBLE * SUPPORTS UP TO 2 RLL HARD DISCS AND
2 FLOPPY DRIVES * SUPPORTS SIDE TO 12 MB.

BAUD MODEM NEW LOW PRICE! FRICE BARR TO TRACE UP NOW THAT JOR S FRICE BARR ER ON 2400 BAUD MODEMS • AUTO DIAL ANSWER • SELF TEST ON POWER UP \$119.95

DIABLD \$27995 PRINTER

\$219.95

\$79.95

\$84.95

\$64.95

IBM COMPATIBLE KEYBOARDS I KEY ENHANCED LAYOUT 84 KEY AT STYLE MAXI-SWITCH ENHANCED LAYOUT MAXI-SWITCH AT STYLE **ACCESSORIES** 20 MB HARD DISK ON A CARD \$349.00

ARCHIVE 40 MB TAPE BACK-UP LOGITECH MOUSE MONITORS SAKATA MONOCHROME SAMSUNG MONOCHROME \$69.95 \$129.95 CASPER RGB CASPER EGA \$279.95 \$399.95 \$599.95 NEC MULTISYNC II

EGA SPECIAL!

SAVE \$50 BUY AN MCT-EGA CARD AND CASPER EGA MONITOR FOR JUST \$498. % HEIGHT FLOPPY DISK DRIVES

514 DS DD 360K 514 FUJITSU M2551A DS DD 360K 514 TEAC FD-558 DS DD 360K A4 DS HD 1.2M A4 FUJITSU M2553K DS HD 1.2M A4 TEAC FD-55G DS HD 1.2M A9 MITSUBISHI DS HD 1.44MB

JOR MICRODEVICES, 110 XNOWLES DRIVE, LOS GATOS, CA 95030 LOCAL (408) 866-6200 FAX (408) 378-8927 TELEX 171-110

\$24.95 RETAIL STORE: 1256 SOUTH BASCOM AVE., SAN JOSE, CA (408) 947-8881 HOURS: M-F 10-7 SAT. 9-5 SUN. 12-4

MCT-ATEH

Hook-up with the CAD System Specialists

AT System

on Instrument DMP 42 Plotter

EGA Card and 14" Monitor Summerraphics 1201 Digitis

386 System

Calcomp 1023 A-D Size Plotter NEC Multi-Sync II 14" Monitor

agraphics 1201 Digitizer \$9350

· Digitizers & Plotters ·

Kurta 12 x 12 cordless \$2935 Kurta 36 x 48 w/16btn CalComp 12 x 12 w/4btn \$395 Hitachi 12 x12 w/4btn Hitachi 11 x 11 w/12btn \$635 CalComp 1023 A-D \$3795 Houston Instrument 62 \$4550 Hewlett Packard A-E \$7650

Schlumberger Call · Graphics Display Systems · EGA Card & Monitor \$499 Photon Mega Plus \$1149

Number Nine SGT w/NECt1 \$1859. Number Nine 1280 x 768 \$4259 Artist 10 1024 x 768 \$4299 Verticom H-16 1024 x 768 \$4399

Summagraphics 1201 12 x 12 Digitizer with 4 btn cursor

\$339 CalComp 1043GT

\$5999 SALES INQUIRIES (800) 223-1085



 \oplus

(817) 232-1075



☐ 10/6 MHz 80285-10 CPU D 512K RAM EXPANDABLE TO 1 MEG ☐ 1.2M8 FOO W/WO CONTROLLER

□ 200W POWER SUPPLY ☐ 101 STYLE KEYBOARO MONO G CARO (720 x 348 RES) 12" TTI MONITOR (AMRER)

□ CLOCK CALENGAR W/BATTERY BACKUP PARALLEL PRINTER PORT

☐ 80386 CPU (32-BIT 16 MHz) 1 MEG RAM JEXPANDABLE TO 2MEG. 4 MEG... 1 1 2 MB AND 1.44MB FLOPPY IS 1/4" & 3 1/2" □ 80 M8 HARO OISK 128 ms1

☐ MONO 6 CARO 1720 X 348 REST 14" TTL FLAT SCREEN WITH SWIVEL BASE ☐ TOWER CASE 275W HEAVY OUTY POWER SUPPLY

SERIAL PARALLEL CLOCK CALENDAR W/BATTERY BACKUP ☐ 101 STYLE ENHANCED KEY80ARD SOCKET FOR 80387 OR 80287 MATH COPROCESSOR

I YEAR PARTS AND LABOR WARRANTY CALL FOR OTHER CONFIGURATIONS!

MONO SYS

1245 **EGA SYS**

1395ء

MONO SYS

w/40MB HDD

MONO

،695

1125ء



(213) 644-1140 ORANGE CA 92667 SAT (714) 538-0929 STOMER SERVICE (213) 644-1140

CIRCLE 274 ON READER SERVICE CARD

Low Prices, Fast Service.



Turbo-XT

- \$398 4 77 & 8 MHz
- 640K Motherboard with 256K 8 slots
 8087 socket
- 150W power supply Option A
- · High resolution amber monitor · Hi-res graphics card • Parallel printer port \$148
- Option B Hi-res RGB color monitor · Hi-res graphics card
- Parallel printer port\$298 Option C
- Hard disk drive Dual hard disk controller
- 30 MB for XT 40 MB For PC/XT/AT ··· \$298 · \$498

Amdek 310A \$98



MICROSOFT MS-DOS 3.21... intal Math Coprocessors

8087-2 \$138 8087 \$98 8087-1 1198 R0287-6 \$178 80287-10 \$268 80287-8 \$228 80387-16 \$468 80387-20 \$728 PC Mouse

LogiTech mouse \$78 Mouse systems mouse 198 Microsoft mouse\$108 Fastrap trackball98 Deluxe joystick Place orders toll free! Continental U.S.A. 1-800-421-5500

Inside California 1-800-282-1710 All others 1-213-973-7707

Fax machine 1-213-675-2522 Prices at our eight store locations will be higher on some items California Torrance Santa Ana Woodland Hills

Kearny Mesa Sunnyvale Texas Addison Hour Georgia Smyrna

1200 Baud Deluxe Modem

2400 baud 1/2 card internal . . . §128 2400 baud external . . .

30 MB Hard Disk Complete kit with

CMS) \$298 10 MB PC/XT Kit..... 20 MB PC/XT Kit.....

controller

20 MB Card..... 40 MB for AT\$338 40 MB PC/XT Kit......\$468 Mountain 40 MB Tape \$398

360K Disk Drive Half height, IBM compatible Direct Drive

Tandon TM100-2 full height for IBM PC or XT118 1.2 MB for AT..... 5\" drive for PS/2.....\$268

31/2" Disk Drive 720K....598 1.44 MB....5128

VGA Package Monitor & Card \$648

 800 x 560 Up to 256K brillant colors Hi-res EGA card 640x480 \$128 EGA monitor 640x350 378 VGA AutoSync monitor

NEC MultiSync II 640x560 . . . \$598 RGB color monitor 640x240 . \$258 Paradise VGA card \$278

orders from qualified firms and institutions No surcharge on credit card orders. CA TX & GA, residents add sales tax Prices & availability subject to change without notice. Shipping & handling charges via

EPSON 9 Pin

EPSON Near Letter Quality Near Letter Quality Printer FX-850, FX-1050, EX-800 Call

EPSON 24 Pin \$369 LQ-500

1 ist Price §529 **EPSON Letter Quality Printers** LQ-850, LQ-1050, LQ-2500 . . Call

PACKARD LaserJet II

\$198

List Price \$2595

Extra Toner Cartridge PDP 4 MB RAM card w/OK . \$198 1 MB 2 MB 4 MB \$348 5648 \$1148

198

HP DeskJet

List Price ⁵995 300 x 300 DPI with full with full page graphics PDP 128K RAM Extra ink cartridge

Laser Printer

1.5 MB RAM card . .

Toner cartridge ... OKIDATA Okidata 320...

Okidata 321..... Okidata 390..... Okidata 391.....

COMPUTE 4901 W Rosecrans Ave Box 5046

Hawthorne California 90251-5046

UPS ground 50¢/lb UPS air 1 00/lb Minimum charge 13.00. CIRCLE 243 ON BEADER SERVICE CARD



Nabotics 9600 HST WITH 17 200 RPS

THRUPUT AND ERROR CORRECTION.

NOW \$599 WHILE SUPPLY LASTS

FAMOUS BRAND

2400 BAUD MODEMS

Hayes compatible
300, 1200, 2400 Baud NOW \$99 IN PAIRS - SINGLES ADD \$9

FAX

ON-A-CARD Unattended background operation. Send scanned, ASCII, or word processed

matrix printer for output PC EDITOR'S CHOICE

MULTI-LINE INTEGRATED VOICE MAIL TELEPHONE RESPONSE CARE

IDEALLY SUITED FOR 100s . Information & Order Voice Mail Answering System

OF Mail Forwarding & Pager Alert
 In & Outbound Telemarketing Fully Menu Driven by Calling Party. Fits in PC card slot. USES

FROM \$239 THE PROFESSIONAL

BEST PRICES ANYWHERE!



• 80287 Co-Processor Slot • 30 MB Seagate H/D . VGA/FGA Granhins Cord . Novell, IBM, & OS/2



NOW \$ 99 ONLY Your Choice of Ontional Monitor

HUNDREDS OF SALE ITEMS EVERY DAY!

TOSHIBA 130 MB HD TOSHIBA 2 MB 31/2 IN. FD TOSHIBA 1.2 MB 51/4 FD MINISCRIBE 43 MB HD SEAGATE 30 MB HD

VIDEO-7 VGA CARD 129 DRCHID (1024x768) **DRCHID 286 CARD** 99 369. QUADRAM 386/XT GENDA EGA & GEM 299

319 389 699 199

VISIT OUR 24 HR BBS (805) 650-0193 (8/1/N) FOR COMPLETE CATALOG & PRODUCT LISTINGS

BRAND NAMES FOR MUCH LESS!

CIRCLE 175 ON READER SERVICE CARD

Ask About



24-PW 136 CDI 24-PW 136 CDI 300 CPS 80 COL PAGE PRINTER ML390 LASER LINE 6 LASER PI GUARANTEED BEST PRICE . BEST SERVICE M. Wallet SERVICE CENTER

ELECTRONIC

24 HOURS MMMM SE YOUR CREDIT CARD OR JERICE CENTER JERICE CENTER JERICOK, IL 60062

IN IL 1-312-498-79

1-800-458-5446 FAX 1-312-498-3237

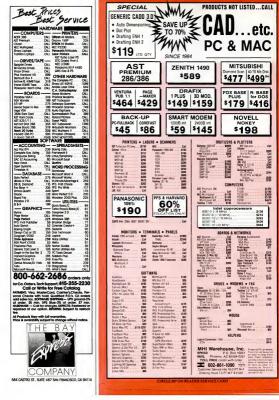
This Section Is For Serious Buyers

We've rounded up all the direct marketers who want your business and made it easier for you to find them in our Direct Marketing Connection.

Now you can quickly find the right PC products and services, the right price and the right vendor, right here in this special section.



FULL TECH



497



PRODUCT CATEGORIES

HARDWARE

ADD-ON-BOARDS 491	PERIPHERALS
CABLES491	PLOTTERS
COMMUNICATIONS 492	POWER PROTECTION
COMPUTER SYSTEMS 492, 493	POWER COOLING SUPPLIES
DISK DRIVES494	
DISKETTES494, 495	PRINTERS
EXPANSION	SECURITY
UNITS 495, 496	SPEED DEVICES

EXPANSION	
UNITS 495, 496	SPEED DEVICES 497
MONITORS	
SOFTWARE	
ACCOUNTING 497, 498	MAILING PROGRAMS
ARTIFICIAL INTELLIGENCE	MANUFACTURING 505
BACKUP SYSTEMS	MEDICAL 505, 506
BUSINESS 498, 499	MULTI-USER SYSTEMS
BUSINESS PROJECT MANAGEMENT 499	MUSIC
BUSINESS TIME	ONE-OF-A-KIND
MANAGEMENT	OPERATION SYSTEMS 507
COMMUNICATIONS 499	PREVENTATIVE MAINTENANCE507
CONSTRUCTION 499	
DATA BASE 499, 500	PROGRAMMERS TOOLS507, 508
DATA ENTRY500	PUBLIC DOMAIN 508, 509
DATA MANAGEMENT 500	REAL ESTATE 509 RELIGION 509, 510
DESKTOP PUBLISHING500, 501	SALES MARKETING510, 511
EDUCATION	SCIENTIFIC
ENGINEERING 501	SECURITY511, 512
ENTERTAINMENT/ GAMES501, 502	SERVICES
FINANCIAL 502, 503	SHAREWARE
FLOWCHARTING 503, 504	SURVEYS512, 513
GENERAL 504	TAXES
GR APHICS504	TERMINAL
HEALTH504	EMULATION513
INVENTORY 504, 505	TRAVEL
LANCHACES	UTILITIES513, 514, 515

WORD

PROCESSING 515

LANGUAGES

LEGAL 505

MISCELL ANEOUS

MISCELLANEOUS	
ACCESSORIES515	DISKETTE COPY SERVICE
BAR CODING 515, 516	
BOOKS/CATALOGUES/ PUBLICATIONS 517	EMPLOYMENT OPPORTUNITIES
BUSINESS	FURNITURE
OPPORTUNITIES	LEASING/RENTALS
COMPUTER	MAILING LISTS 518
INSURANCE 517	NETWORKING 518
COMPUTER SERVICES	SUPPLIES 518, 519
CONSULTANTS	TRAINING/TUTORIALS 519
DATA	TYPESETTING519
CONVERSION517	
DIGITIZERS	USED EQUIPMENT
DISK CONVERSION 517	

RATES AND INFORMATION

PC Manazine Marketplace is a special economical section for product and service listings Listings are grouped by category and sold by column inches. Second

color option available. Standard Directory Listings are also available for a minimum of 4 issucs at \$500 per issue (\$2000 total).

For additional information call 212-503-5115.

MARKETPLACE ADVERTISING STAFF

Group Sales Director Kathryn J. Cumberlander Group Sales Manager Daniel L. Rosensweig Support Manager Monica B. Dixon Sr. Advertising Coordinator Linda Annis-Lopez

Advertising Coordinator Wanda D. Brown Production Manager Anne Brockinton Production Coordinator Robert Clark

ACCOUNT MANAGERS

Glenda Campbell (212) 503-5118 NY, GA, PA, VA, DC, OH, AK, WY.

mics Farmer (212) 503-5156 TX, MN, WI, AR, NC, IN, RI, DE, SC, LA, ID, MT, OVERSEAS Kathleen Morris (212) 503-5176 UT. TN. NB. HL (CA 94000 & UP)

eth Nova (212) 503-5175 WV. FL. VT. NH, (CA 93996 DOWN) Michael Brooks (212) 503-5125 MI, CT, IL. KY, ME, OR, OK, AL, MO, NM, IA Angela Kiffin (212) 503-5117 NJ. WA. MD. AZ. CO. NV. MS. KS. ND. SD (ALL CANADA)

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

HARDWARE/ADD-ON-BOARDS

てしつくはとうろつ Every IBM and Apple If computer needs a clock. The ClockPro

keeps perfect time and doesn't waste a valuable slot. It's easy to install and works on any IBM PC. XT. AT. Apple Ne, Nc, 1[+ and all compatibles and is covered by a full 10 year warranty and 30 day money back guarantee.



TO ORDER: 1-800-458-5448

APRICORN 10670 Treens St., Suite 10, San Diego, CA 92131

Never enter time and date again. dClock II \$49.95 Slotless Clock-Calendar

· Compatible with most computers. · Easy to install. Replaceable battery. 30-day money-back guarantee. Great gift idea.

To Order (214) 788-5198 Or write to Microsync 15018 Beltway Drive MICRO Dallas, Texas 75244 Please add \$2.50 for shipping & circle set on reader service care

AT CLOCK BATTERIES

Long Life Alkaline Replacement for AT Type Lithium w/ 4-pin connector

3 Volt Lithium "Coin" Cell Visa MC Shipping incl. 1-800-336-5933

In IL: (312) 336 - 5933 Clairvoyant + Systems P.O. Box 8693 Waukegan, Minois 60 CIRCLE See ON READER SERVICE CARE

540K MotherBoard Upgrades 640K RAM without using an expansion slot. Our upgrades allow easy insertion of 256K chips on the system-board 100% comp. 30 day \$-back dtd. 2 yr wmty Compaq Portable \$29 (+ memory). IBM-XT, 3270. Portable: \$39 (+ memory). IBM-\$49 (+ memory). Call for memory price. \$4 sh. Site Olsc. Dealers Welcome ARISTO Computers, Inc. 6700 SW 105th Avenue, Suite 307 ton. OR 97005 503/626-6333 or 800/3ARISTO

EGA GRAPHICS ADAPTER FOR AT&T SYSTEMS PC6300 • PC6300Plus

• PC6310 • PC6312 • PC6386

1-800-854-0505 IN NEW YORK 1-800-632-2444 SINGLE 663 ON READER BERWICE CAN

THE X-BANDIT 4 EMS 4 For XT/AT Enhanced, expanded memory utilizing LIM 4 0 specifications. Segmented memory mapping, split memory addressing 2 mb in one stot. 8 mb total Species, RAM disk auto configuration software, manual, warranty all included \$175 list. Dealer priong available. TELETEK ENTERPRISES, INC. 4600 Pell Drive Sacramento, CA 95838

(996) 920-4600

CABLES

We STOCK a FULL LINE of DATA SWITCHES, CABLES, BUFFERS & SPOOLERS! Parallel Printer Far Away? Parallel Printers used to be limited to 10



feet. That's all changed with Long Links Install in minutes and move your parallel printer up to 7000 feet away. Long Link includes transmitter receiver power SUD supply 6, 50 feet of FREE Cable Fast 600 LPM operation. Two \$16995

To Order Write or call Tipz Computer Accessor antity, & payment info (Visa, M/C, PO, or Mor

order is shipped the same day via UPS for FAST Delivery Orders CALL 1-800-367-8479 Customer Service, CALL 415-626-4333 it you'd the a FREE CATALOG, just write or call us

30 day mesey back guarantee!

Tipz Computer Accessories PO Box 690 San Francisco, CA 94101-0590 CIRCLE 932 ON READER SERVICE CARD Printer Cables \$1 a Foot!

RS-232C/422A USERS: BI-DIRECTIONAL CONVERTER for EXTENDED USE Convert RS-232C to .* RS-422A and/or RS-422A to RS-232C

\$49.95 MODEL 422000

own Extends cate weights up to 4.000 feet the cates of the E-B I RS KC/CCR Conventes can exent with the Conventes can exert with the nerty IOV DC at 100 ms. Optional power supply available to See Cornel from Manufacturer FOCAT and SAVET

B.B electronics 1528H Boyce Memoral Onve - P O Box 1040 Ottawa II 61350

Phone: 815-434-8846

allows you to add an extra keyboard and monitor up to 250' from your

C system unit PC system unit.
Operates with Mono, CGA
and EGA monitors on IBM
PC/XT/AT computers and
100% compatibles.
OEALER PROGRAM AVAILABLE PRICES START AT 1219.00 CYBEX CORPORATION

ON READER SERVICE CARD

— 6, 10, and 24 Fool Prelabrical Call for Catalog - Serial or Parallel . Oustorn Cables from \$2 50/k., Min. 10 ft. · Switchboxes, all lines switched

AB DB25/Centronics \$29.95/\$35.95 ABCD DB25/Centronics \$49.95/\$54.95 - AB Monitor/Keyboard Switch \$65.00 Visa, MC, COD, Present 100% Guarantee Artel Accessories 8656 Holyecton Orive

(916) 685-1739 Fly Garner CA 95624

PC Magazine Marketplace the ultimate target market!

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their nttention to PC Magazine Marketolace

For them PC Magazine Marketplace's Direct Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and

If you think that your business can benefit from the 550,000 brand specifiers who read PC Magazine ... YOU'RE RIGHT!

So take DIRECT action and cali (212) 503-5115

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

COMMUNICATIONS

PhoneBoot by cybex



 B ring pickup lets you share a voice line
 Built-in hardware security code Buil-in hardware security code
 Six outlets, 16 Amp capacity
 Some protection for both AC and Telephone line nly \$305, includes utility dishette with examples for

CYBEX CORPORATION 2800 H Bob Walace Avenue Huntsville, AL 33605



PC-HOOKER

A powerful and easy to use connectry tool that lats you hook together any two IBM PC compatible computers and transfer files in either direction at speeds exceeding

Faster than Lap-Link" Easier than Bridge

115.000 baud

Connects any two PCe Serial and parellel Exceeds 115,000 baud Two way transfers DOS organizar Full text editing Talk mode

Heyes modern eupport Print fecility Universal cable 5%" and 3%" disks PS/2 ready

Complete only \$59.95 To order call 1-800-888-8455

AMICA 102 S Main Street Park Ridge, IL 60063 CINCLE 572 ON READER SERVICE CARD COMPUTER SYSTEMS

1988 BEST BUY

Case. MB. XT 150 ps. AT 200 PS Phornix Bios 12 MHZ XT \$230 • 12 MHZ AT

Case, MB, XT 150, PS, AT 200 PS, XT 360K, AT 1.2, Controller, PH Bios XT 12 MHZ \$330

\$485

\$710

 AT 12 MHZ Min. Order - 3 ea.

512-467-2330 ADVANCED MICRO TECHNOLOGI CIRCLE MIZ ON READER SERVICE CARD

BEST SYSTEM BUY

STI 88 \$499 4.77/10MHz/0 wait/640K RAM 360K FDD/FDD Controller/KB ck/colendor/1 serial 1 nomilei &

I game port/150W power supply STI 286..... \$980 6/10 MHz/640K RAW/200W

Enhanced KB/1.2 M&FDD WD Duoi FD/HD Controller deck/colender/8IOS STI 386 \$2,595

WIS 40MB HDD Other peripherals also available — CALL

Summit Technology O. Box 201702, Austin, TX 78720-170 (512) 335-0522 CIRCLE 562 ON READER SERVICE CA

COMPUTER SYSTEMS

THE LOWEST COMPUTER PRICES FOUND ANYWHERE!

LOOK! AT&T - PC 6386 IBM RAM, 1.2 MB FDD, 40 MB-\$4,995. LOOK! AT&T - PC 6386 (Without 40 MB):

- \$3,995. LOOK! IBM XT & AT's: --\$1,200 Starting at only

Ask for low, low prices on other products from AT&T, IBM, Digital, Mini's, Mainframes, atc., and charge all of your computer related purchases at only 12.75% APR on the WORLDCARDs credit card

(801) 562-1404 or 1-800-228-0640



COM/SOFT INTERNATIONAL A Division of WORLDWIDE SERVICES! CIRCLE 500 ON READER SERVICE CAP

Radio Shack-Tandy

Our 10th year of DISCOUNTS COMPUTERS & CELLULAR PHONES Fgt. Prepaid Save Tax Toll Free 800-231-3680

We will meet or beat . **GUARANTEED LOWEST PRICES** MARYMAC INDUSTRIES INC 22511 Katy Fwy. Katy (Houston) TX 77450 713-392-0747 Teles: 774132 CLE 561 ON READER SERVICE CARD

Buy Wholesale FROM #1USA COMPUTERS & ELECTRONICS TOP NAMES - BEST PRICES - SUPPORT & SERVICE "Call Now" 1-800 777-1USA MEMBERSHIP \$25 OFF THIS MONTH



FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

ADD ON'S

MARKETPLACE

COMPUTER SYSTEMS

WYSE WYSEpc 286		TOPS SHIBA		IARD MATE	DRIVES		
2108-8MHz \$1,125 2112-12MHz \$1,525 2200-10MHz \$1,325 CAUL 2214-12-5Mz CAUL 386-16MHz	T1000 T1100 T1200 T3100	\$845 \$1,399 CALL	20MG 30MG 40MG 85MG 80MG	\$295 \$485 \$375	20MG CARD 30MG CARD 27MG 45MG 71MG		

NEC PRODUCTS
BEST PRICES
PRINTERS
MULTISYNC PLUS
MULTISYNC PLUS
MULTISYNC PLUS
MARGONIC
MULTISYNC PLUS

XT EXP.MEM CALL XT (/O w/sec/par CALL AT EXP MEM \$199 NEC CALL AT VO wheelp HERC, COMP CALL MULTI WHITE STAR GB1 COLOR BO. CALL COLOR GRAPH CALL PORTABLES

SPECIALTY ITEMS
W200 UNIVERSAL I/O BOARD
16 BGHT BIT ANALOG OUTPUTS
14 HIGH VOLTAGE! / OURPENT OUTPUTS
1 ANALOG OUTPUT
PLUS PROTOTYPHIS AREA
10 PROGRAMABLE DISCRETE INPUTS/OUTPUTS

MW777 MULTI FLOPPY DISK SWITH
A SWITCH BETWEEN 3.5 AND 5.25 DRIVES, ALLOWS USER TO HAVE MORE THAN
2 FLOPPES IN MS SYSTEM, KEEP TWO 5.25 AND ONE 3.5 OR VICE VERSA.

MICRO WORLD ELECTRONICS SALES 1-800-288-8088 SUPPORT 1-303-988 5907 PRICES SUBJECT TO CHANGE: MC, VISA. ACCEPTED



Get The Word Out! Your Product Has Been Chosen EDITOR'S CHOICE.

Let us take your article to its highest

level of marketing potential with a reprint!

To find out how you can have your article or review elegantly reprinted ** on 80 fb. paper stock, in 4-color, 2-color or 1-color, call or write today:

Jennifer Locke—Reprints Manager; Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016, 212-503-5442.

"Waterum quartity 500 monets

distinct deposity to release

SSSS LOWEST PRICE HARD DRIVES ADD ON BOARDS SEAGATE 20MB KIT AT EGA WONDER ST-225, CONT, CABLES \$249 Mono Graphic Card W/Par. Port. \$49.50 Color Graphic Card W/Par. Port FUJITSU 360K Floppy Drive EAGATE 40MB, ST-251 SEAGATE SOMB, ST-4096 \$669 FLUITSU 1.2Meg Floppy Drive OGITECH Mouse PRINTERS CPI 12008 Modem W/Soh DOOW Power Supply \$79.50 150W Power Supply 101 ENHANCEC Keyl MONITORS SYSTEMS 40 Meg H. Drive, 1.2 FD \$1349 640K FLAM, Monitor & Tol X and X ING EGA WITASwive (713)988-6566 ONE YEAR WARRANT Atot Bress (818)915-5495 All prices are subj to change

LAPTOP SPECIALS ZENITH - TOSHIBA - NEC

- AFFORDABLE SW or 3W EXTER-MAL and INTERNAL DRIVE UNITS OF LAFTOPS and DESKTOPS (360K, 720K, 1.2K and 1.44K), OLICOMIX PRINTERS ... 1200 AND 2400 BAUD MODEMS for LAPTOPS. For Low Pricing and Fast Reliable Service call

COMPUTER OPTIONS
UNLIMITED
for the Smart Beyer
201-469-7678 • 7 Days

SAM-10PM (EST)

CRICLE SSI ON READER SERVICE CARE

IBM

1.BM
Model 30 Rethz 640k 271.5" \$275
Model 30 Rethz 640k 20mb \$3495
Model 50 Workz Im 3.5 20mb ... \$2895
All Other Models Available ... \$ call

We Will Best Any Price On Stock Item
P C TECHNOLOGIES
(312) 430-2800

Radio /hack-Tand

COMPUTERS
PRINTERS
CELL-PHONES
FAX-UNITS, etc.

COMPUTER WAREHOUSE CLUB 13to HWY 327, GRANBURY TX 70140 Cust Serv. (817) 573-0220

CM. Nov. BY A.Y. (BLD) - CTL ADDO: ROLE STO ON READER SERVICE CARD

IBM PS/2's

| None |

American Micro Computer Center 2899 Griffin Rood - Sulte # 4 Ft. Londerdnie, Ft. 33312 (305) 985-9406

HW/Disk Drives

begin on following t

following page

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

DISK DRIVES

DISK DRIVES

150 Mbyte Package \$3,195 320 Mbvte Package \$4,495

- . 16 msec. access time
- . Supports DOS, Xenix, UNIX on AT's and 386's
- . EDSi controller, cables, mounting hardware . 1 year swapout with FREE hotline support

CALL: 1-800-922-9050 (In Texas, 512-346-8360)



Ten X Technology, Inc. 1807 Spicewood Springs Rd., Bldg. 3 Austin, TX 78759

CIRCLE 779 ON READER SERVICE CARD

PS/2 and Laptop Compatible Systems

Call TOLL FREE: 800-544-4252 CA & tech info (818) 589-1818 MicroSense 5580 La Jolla Blvd, Suita 313, La Jolla, CA 92037

 5.25" 360K or 1.2Mb External for PS/2 models 25: 30: 50: 60: 80: Easy setup professionally built 360K (#28 EXPS) \$290.00 1 2Mb (#29 EXPS) \$319.00

. 1.44Mb 3.5" drives read write format

Teac and Toshiba 1 44Mb w frame (419 HD) \$199.00 External 1 44Mb case power supply cable (420 EHD) \$275.00 Adapted 2372 RLL centroller. 2 hard, 2 lioppy, sustained 1:1 interleave \$220.00

* 720K 3.5" Toubibe drives with: Compaticard Roppy disk controller for PC KT AT 386 Adds 4 Roppys of any sund 144 12 720, or 360K to your computer Softwara included (#16 HDC)

 5.25" 360K External for all Toshibb lap-tops and Zervith 181-92 and 93 taptops Toshiba models (#6 SPW) \$235.00 Zendh models (#11 ZPW) \$245.00

Micropolis 71MB 28ma \$649 Miniscribe 71MB 28ms \$669

40MB 40ms \$359 ST251 ST251-1 40MR 28ma \$410 20MB 35 W \$270 ST125

PUINC (714) 870-9033

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115

8 INCH DISKETTE SYSTEM Read, write, and formal diskettes from IBM maintraines, minicorrouters, data entry equip-

ment, etc. Complete easy to use software handies EBCDIC conversion. Can read and write CP:M 8-inch diskettes (many formats). You also can use 8-inch drives for PCDOS files; 1200 KB per diskettel \$1395 complete MICROTECH EXPORTS

525 Alma Street Pale Alle CA 94301 415,324,9114

PS/2 DRIVES FOR PC'S AT'S CompanKit-PC. CompatiKit-AT Built-in floppy controllers no problem. Sup-

ports multiple drives and formats. Lets your computer use IBM PS/2 14M diskettes plus ware Diske by the internation. MISH MICHOD CHECK MICRO SOLUTIONS COMPUTER PRODUCTS 132 W Lincoln Hwy DeKalb, IL 60115

815-756-3411

OPTICAL DISKS

 LASERDRIVE as featured in PC WEEK 4/26/88

ce in Play to any operating system only \$4995 Limited time only

PANASONIC LS5000 \$2495 - 200 MB

OPTICAL MEDIA & Panasonic

We carry a full line of 51/4" & 12" Optical Drives SKAN TEKNOLOGIES, INC.

optical storage systems (212) 809-5570 (516)295-2237 CIRCLE 175 ON READER SERVICE CARD

DISKETTES

AMERICAL GROUP 51/4" DS DD 29° **MCLUDES**

LIFETIME WARRANT 3 1/2" DS DD (min 25) 5 1/4" DS HD (min 30) 5 1/4" DS HD (Color) 5 1/4" DS DD (Color, min

Visa MC accepted 12132 Sherman Way N. Hollywood, CA 91605

(818) 765-3040

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

DISKETTES

Why waste your time formatting disks?

Preformatted disks save you time and money!

Memorex • Nashua • 3M 5¹/₄" (from 48e) • 5¹/₄" HD • 3¹/₂" • 3¹/₂" HC Call toll-free TODAY!

-800-321-4668

onorado (303) 234-0871. Open 8:00 to 5:30 untain Time, Monday---Friday.

ducts, 1315F Neison St, Denver, CO 80215

\$329

\$309

DISKETTES

DISK AMERICA

5.25 DS/DD DISKETTES

100% MONEY BACK GUARANTEE!!!

FREE!!! LABELS, SLEEVES & WRITE PROTECT'S NO HIDDEN COSTS MINIMUM ORDER-100 DISKS SHIPPING AND HANDLING \$4,00 Per Box

VISA, MASTERCARD, AMEX, DISCOVER & COD HOURS: WEEKDAYS 8 AM to 11 PM EST: SATURDAY 9 AM to 7 PM

1-800-634-2494

TAKE

DISK

purchasing your disketes. All of our disks are fully certified. Each disk has an

is, shows and write oraset table

Double sided, double i Boses of 200

rric 5%" High density, 96 T75

Double sided

nte 55."

estricted lifetime warranty. There are tolden cross. All dislates come with

29 er

2 09 es

ANn

24 HOUR SHIPPING

The BEST for LESS

Quality 51/4" DS/DD Diskettes

Min. 100 ed Two-for-One Replacement if found initially defective

within six months FREE sieeves, tabs, tabels 51/4" COLOR (Min. 100) ... 39c

51/4" HIGH DENSITY Min 501 Brand Box 51/4" (Min. 10) . \$3.99 Brand Box COLOR 51/4 with FREE Plastic Case

(Min. 10) \$4 99 31/2" DS DD (Min 50) \$1 09 100% Lifetime Warranty Shipping \$4.50 per min orde

\$2 00 each add! lot MC VISA Only 1-800-537-1600

erator No. 67

Dept No 1523 P.O. Box 61000 San Francisco, CA 94161 SLE NOT ON READER SERVICE CAR

DISKETTES! 5 25" DS/DD In Stock

29¢ ea. (qty of 100) eves, Labels, & WP Taha

Tyvek Sleeves add 4¢ 3.5" DS/DD In Stock \$1.19 ea. (pty of 100)

\$1,29 ea, gly of 50 \$1.39 ea. ally of 25

FREE shipping for orders over \$100; otherwise \$3.50 VISAMC, Check & MO eccepted Orders ship in one business day Disks are 100% certified DS/DD. C.O.D. orders add \$250 Ohio orders add 5.5% sales tru

ADD'L PRODUCTS AVAILABLE ORDER CALL TOLL FREE lay-Friday, 9am-7pm EST

1-800-288-2887 1776 Dividend Drive Columbus, OH 43228 (614)-771-8771

EXPANSION UNITS

AT TOWER PITS AT MOTHERBOARD EIGHT HH DRIVE SLOTS 250 W POWER SUPPLY



enclosure technologies, inc. P.O. BOX 87275 CANTON, MI 48187 (313) 459-3557 CINCLE STI ON READER SERVICE CA

EXPANSION UNITS

Name Brands * Low SS

ampage 2tm [15/8-250] If Above PC [644-266] we PC PS [644-266] we 256 (512k-266) we PS 256 (512k-267) we Board 2 for PS2 50/60 and 386 PC (1M) . \$769

.\$769 AT (0k) VEGA D RE Kits Iron 20vd

VLM Computer Electronics e, Morristown, NJ 07960 Visa, MC, Check or CO

PROMPT DELIVERY! TC.

(918) 267-496

CALL DRAM CO

S. DIP & SOJ

Ney Price subject to cha-in order \$20, MC/VISA add UPS Ground \$5 ar \$7 (1 lb)

(415) 398-2987 Open M-F 9-6

EXPANSION UNITS

DYNA	MIC	DAMAC	PROCES	SSORS	E. PRO	MS
DINA	NIVIIC	CIVIA	80387-20	\$735.00	27C921-25	\$54.00
SIMM	100 12514	CALL!	80387-16	\$405.00	27C512-20	\$15.00
	100 120 0		80297-10	\$295.00	27512-25	\$12.95
1Mbit	120re	\$36.00	80287-8	\$205.00	270256-25	8 5 90
51258		CALLI	60287-B	\$159.00	27256-25	\$ 4.90
51238	70 NO 100	CALL	80871	\$109.00	27C129-25	\$ 8.25
41256	80 100 100	CALLI	8087.2	\$145.00	27128A 20	1 5 65
			8067	\$102.00	27128A 25	5 5 25
41256	150mi	\$11.25	80386-16	\$ DALL!	27C64A 20	\$ 450
41264		\$14.75	V 30 annu	\$ 12.75	2764.25	\$ 350
	15016		V 20 tome	\$ 17.00	2738A-25	\$ 4.00
41464	19016	\$10.25	V 20 avro	5 8:50	2716	5 4 50
4164	190 120 150	CALL	S. R	AMS.	4364 15	\$14.50
Pinana Cathfre	SWM SETP E	CC and more	43256 12	319.95	6116.15	1177

I.C. EXPRESS (800)892-8889 Mon for 8500 PST (800)882-8181 ps CIRCLE SEZ ON READER SERVICE CAN

Your system works! Finally! Don't scrsp it... Keep it growing with PC-XTRA

S SLOT EXPANSION CHASSIS PC-XTRA makes morn for the add-ons

you need for continued growth. No hardware modification! No so

\$449.00 only \$549.00 tab Sans Au Cent

Made in U.S.A.

PC HORIZONS, INC. 1710-M Newport Circle, Santa Ana, CA 92705 (714) 953-5396 cincus set on readen service CARD DEALER INQUIRES INVITED

PERIPHERALS

MAINFRAME TAPE SYSTEMS for PC/XT/AT/PS2 and MAC!

Our "Tape Connection" products can read and write your 9-track 1/2" 800/1600/6250 BPI magnetic tapea from mini and mainframe comp systems using your PC. We have developed dozens of transfer programs and manufacture many models of tape controller cards and cables. We sell hundreds of systems each month and offer ou customers the lowest prices, best service and technical support.

Call us today for the best price on tape drives from ANRITSU, CIPHER, KENNEDY, and QUALSTAR. Dealer and volume discounta available

1120 KAIBAB - FLAGSTAFF, AZ 86001 (602) 779-3341 • TLX 705609



PERIPHERALS



MINISTREAMER* and any mainframe or min Transfer rate is up to 4 megabytes per minute on PCs and compat-ibles. Subsystems include 7 or 10 ½" streaming Tape drive, Tape coupler card and DOS or XENIX compatible software.

Prices start at \$2,005 Qualstar 9621 Irondale Avenue Chatsworth, CA 91311 Telephone: (818) 882-5822

Maintreme to PC Data Transfer Maintenne co - co co
 High Speed Backup
 All Software, Complete System Service and Support, easy

call (818) 343-8505 or write to Contech Computer Corp. P.D. Box 153 Tarzane, Calif. 91356

CONTECH



Now you can exchange data file between your IBM PC/XT/AT computer using IBM compatible 1600 BPI 9-Track tape. Unit can also be used for disk backup.

ICLE STO ON READER SERVICE C

9 TRACK TAPE SYSTEM FOR IBM PC XT AT

PC Magazine Marketplace the ultimate target market!

PLUG A CASH

DRAWER INTO YOUR COMPUTER Turn your Computer into a powerful Point of Sale System! =

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they tred as quickly as possible

polis, MN 55430 = (812) 560-1440 on of Upper Midwest Industries, In-

CRICLY MIS ON BEADER SERVICE CARD

PERFORMANCE PERIPHERALS

TOSHIBA LAPTOP COMPUTERS

2400 bps Expansion Card Inte with RJ11 and DE-9 COMMS the T3100, T1200, T1100+, M24E

COMMS-2 Expansion Card: \$232E
 Internal Card (T1000) \$2321

AdaptnPAK 12V battery power adapter and rechargeable pack (13100): P80 ... \$399

(See FIRST Looks, 2:16 PC Mag. pg. 52) PRODUCT R&D Corporation 1194 Pacific, San Luis Obispo, CA 9340 Prone (885) 546-9713 FAX (885) 546-97

They'll DIRECT their attention to PC

Marazine Marketple For them PC Magazine Marketplace's

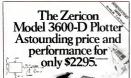
Direct-Response/Display Ad format repre sents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the infor mation they wast regarding price, volume discounts, specifications and delivery If you think that your business can bene fit from the 550,000 brand specifiers who read PC Magazine YGU'RE BIGHT

So take DIRECT action and call (212) 583-5115

THE SHOWCASE FOR PRODUCTS. AND SERVICES IN THE MS DOS MARKET . . .

MAGAZIN

PLOTTERS













POWER/COOLING SUPPLIES

URBO-COOL 150: Cool. Quiet Power



MODEL.	POWER	COOUNG	MOCSE	PRICE
STANDARD IT	1509	188	570	500
STANDARD AT	2009	1.61	\$70	\$125
SQ150 PC:TT	1509	140	-40	\$129
5G290 AT	200W	1.00	-th	\$100
TOISE POINT	1359	2.78	-505	\$749
TC300 PC/XT	200W	2.72	570	\$149
TC250 AT	2509	1.65	\$70-	\$100

ponents patented cooling system 1 year warranty PC COOLING SYSTEMS, INC.

'Cool It...



The NEW Cool Chip Heat Sink Easily attaches to your Processor or Coorocessor for up to 25° Cooler Operation and Longer Life! Fits PC's, XT's, and compatibles.

ORDER NOW! or send for Free Info. School of P 0 80x 334 Dept PS Groves 1X 77619

PRINTERS



SECURITY

POWER SURGES ARE THE BIG DESTROYER OF COMPUTERS! So when SAFEWARE designed the original

computer insurance policy, they decided to cover even the notorious POWER SURGES. Today you can buy comprehensive, full replace ment protection against theit, accidents, fire, earthquake, water AND power surges for as little as \$39 a year Call for details & immediate coverage 1-800-845-3469 SAFEWARE. The Insurance Agency Inc. 2929 N. High Street P.O. Box (2211

Columbus, OH 43202-0211

SPEED DEVICES

IBM-AT SPEEDUP

Photo sector — 6. 10, 12, 14 and 16 MML feel relief d quaterneed FAST 80289 — Replacement CPU for speed above 10 MMz (FCU1-M) 8298 FAST PAM — 1281-4 2564, 100NS 8 120NS (FW) 10 MMz (FCU1-M) 129N 8 120NS (FW) 10 CM 10 MMz (FW) 10 CM 10 MMz (FW) 10 CM 10 MMz (FW) 10 MMz





Post Office Box 866 ▲ Flemington, New Jersey ▲ 08822

SOFTWARE/ACCOUNTING

The leading fund accounting system for local

goets and non-profit organizations. Modules include General Ledger, Accounts Payable, Encombrance. Obligation Tracking. Accounts Re-censible, Payroll, Budgeting, Fixed Assets and Donor Receipts. The system supports up to 99 lunds, 9999 depts. PC-FUND runs on the IBM-PC and most MS-DOS and XEMIX compute AMERICAN FUNDWARE, INC. PO. Box 773026 Stramboat Springs, CO 80477 (800) 551-4456 (303) 879-5770

dbase accounting tools "GENERAL LEDGER "ACCTS PAYABLE "dINVOICER & A/R "SALES ANALYSIS "SERVICE BILLING "ORDER ENTRY "JOB COSTING "JOB ESTIMATING PLIACH ORDAN/ENTORY *PNYROLI \$99 to + s&h widBASE 2, 3 or 3 + Source Code SMITZYZ RAMATAD

4876-P Santa Monica Ave San Diego, CA 92107 (619) 223-3344 Visa-M/C-AMEX-Check-COO

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

ACCOUNTING



World's Finest Fund Accounting Software

UNIX, XENIX, VMS, MS-DOS, PS/2, Networks COROLN WILLITS SYSTEMS 35754 Mission Blvd., Fremont, CA 94536 * (415) 790-5600

CIRCLE MA ON READER SERVICE CARE

Money-Back Guarantee

You'll PASS the CPA Exam. Over 2,100 multiple-choice and essay problems with text solutions from recent A exems. The softwere keeps your

scores and tailors your study to the material you need to pass the exam. Continuing Professional Education courses with hour for hour credit elso evaluble. Call for brochure end QEMO information

1-800-241-9700 In Coloredo: (303) 799-0099 For IRM PC's and compatibles MEY Martin Card Visa accorded

14 Inverness Or East, F-104 Englewood, CO 80112 icroMash* LE SOS ON READER SERVICE CARD

 General Ladger . Account Decementar

 Account Payables Includes source gode with a 30 day trial period

The RB- ACCOUNTANT II 299.95 Shipping & Handling 10.00

RBASE FOR DOS version 2.1 required * Software Specialist 5820 Princess Dr. Rockford, IL 61109 815-398-6863 CIRCLE SAZ ON READER SERVICE CARD

GIP FUND ACCOUNTING

The MIP Fund Accounting System meets the financial and managerial reporting requirements of not-for-profit and governmental organizations. The System leatures multiple fund and fescal years, usor-defined reports and six levels of account coding. Modules offered G/L, A/P, A/R. ayroli, Encumbrance, Expenditure Budget, Revenue Budget and Lotus/DBese Interface. MIP FAS is available for IBM XT and compatibles. MICRO INFORMATION PRODUCTS 505 Fast Huntland Dr. Suite 340 (512) 454-5004 1-800-MIP-FUND

THE PAYROLL

If you've been looking for a payroll with the power to handle a real job, you just found it. This system is the same one used on the HP3000 super-minis with feetures you didn't think you could possibly get on a PC...like accruals, 401k plans, usertomized date and

CORT DIRECTIONS

65175 Cline Falls Road Bend, OR 97701 (503) 388-3900 CIRCLE 750 ON READER SERVICE CARE

DAC-FASY 2 0 ADD-ON see is what you get. Direct access to accounting

RBASE for DOS Users Avaid DAC-Easy reporting limitations. Create fee-formal financial statements or reports with WordShert interactive report design: What you

> data to produce any report. Easy to learn and use. Works with any lear or printer \$79. Visa/MC Audimotion Composition 36 Bridlewood Blvd

ncourt, ON Canada M1T 1V1 (416) 494-7820

IRIE POINT OF SALE SYSTEM Fast, liexible Retail/Wholesale manage system Inventory control. Multiple price levels Automatic price & description look up. Order entry improng Add delete entries before finalizing sale. Cash drawer access secured by

password. Sales tax summary. Cash receipt journal A/R. Billing/Statements. IRIF Systems 3095 South State Road #7 Suite 203

Miranur FI 33023 305-981-5747

> TO PLACE YOUR AD IN PC Magazine

Marketplace Call (212) 503-5115

BUSINESS

THE GENERAL STOR



Point of Sale Inventory Control &

General Ledger he old general store sold everything from A to Z. Now there is a ratall software system that controls every type retail business from Apparal stores to Zoo gift shops. The Ganeral Store system is a reliable, field proven business tool, developed by retail management and computer professionals, successfully serving dozens of different retail businesses. Best of all, it is a complete multiuser business system providing online credit card authorization and support for bar code scanning, electronic cash drawers and specialty receipt printers. For a limited time only \$995. Visa

and Mastercard accepted Dealer inquiries invited Crichlow Data Sciences, Inc. (804) 426-7628 THE DEPARTMENT STORE OF RETAIL SYSTEMS

TRACK TIME, CAPTURE CASH. NO SWEAT.

timeslips III

rfect for attorneys, accountants, consultants, and ALL service profe-onate. By automatically tracking time and expenses, TIMESLIPS III give ut fastar and more accurate billing. The ability to recover cash fing cou-se fallen through the cracks. And a better handle on your own productivity emony resident, uses 60K RAM · Ganarates custom financial Tracks time with a "stop-watch"

Batch enters timelexpense data Thousands of custom bill . Exports data to spreadsheets and databases • Auto backup, built-in macros

optional "Accounting Link" software bridge makes IMESLIPS III compatible with Dac-Easy", Peachtree", areat Plains", and many other accounting packages.

(Rated 9.3 by InfoWorld)
"TIMESLIPS is the best time and billing system at any price."
—Chicago Tribune 1-800-338-5314 TO ORDER Call 617-768-6100 for information/rush service.

\$199.95 plus \$700 s/h Not copy protected, 30-day money back of

NORTH EDGE

SOFTILIBAE CORP.

239 Western Avenue Essex, MA 01929

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

BUSINESS

EZ-FORMS EXECUTIVE ata Forma Generator & Ma ox drew, meth mosson, wrep, ex/mport, cut/per de, auto-date/time/#. Most printer On-line help, more, Only \$89 + sr

rms Combo Pack — 220 + add s only \$79 with purchase (\$150 seer Fort Peck -- 5 portrait and 5 cape line printer soft forts. Only \$49 \$5,US48; \$10/W/HyPF/Canada; Bend orders to: EZX Corporation Send orders to: EZX Corporation SE NASA, #1777, Webster TX 77568

BAMCIAX ORDERS ONLY PLEASE-1 + 600 + 999 + 5999 est. Mee -/Cust.9vc: 713/338-2238 est. M RCLE 562 ON RE41WA + 4238

HIRE - PROMOTE - EVALUATE A better way to make accurate and justifiable decisions abcout people. Saves you time on documentation and approvals for applicant screening, interviews and ment reviews. Be clear about evaluation criteria. Graphic setting of weights and assessments. DECISION PAD for PC's is \$195 ON 30-DAY No Risk. Or testdrive FREE DEMO DISK (timited time).

APIAN SOFTWARE P.O. Rox 1224 Mento Park, CA 94026 (800) 237-4565 ext 122 or (415) 851-8496

PC DRDFR PAG

Smarter than a Cash Register Handles Cash and Charge sales. Prints Receipt/Picking slip. Reports Sales totals with margins. Tracks inventory Easy & Fast On-line HELP Options include Bar Code or OCR Cash Drawer Network or Remote site versions. Runs under MS/PC DOS. Customong awkible Dolors invited COLUMBIA SYSTEMS INC 10420 C.E. Willowet Down

Portland OR 97766 (503) 654-7722

SOFTWARE FOR FREELANCERS! res Expense Tracking, Involving, Contact File & Mailing List Bill your expenses, track leads, make tax prep a snap! Easy to use and

customes, full manual, no accounting jargen Try it for \$40 (NY add 8.25%); just \$90 more to keep it. "30-day NO-RISK GLIARANTEE" Uses 4150 "Tony Stewart's HOME DEFICE" "
309 West 109th Street, No. 2E New York, NY 10025 (212) 222-4332

* * * 1-2-3 SIMPLE AS 1 2 3! * * * SPREADSHEETING 101 simplifies learning all Lotus 1-2-3 features with 256 pg Workbook 8 disturite. Package also includes handy knytoard ternolate plus 171 og Reference Book for sample answers to complex questions SS101 is a mplete learning & user package. Only \$69.95! 30 day money back guarantee! SIMPLE SOFT P.O. RQX 417430, Dept. C. Sacramento, CA 95841 996-338-3857

QubeCalc" InstaCalc "

**Get a 10% discount i QubeCalc ** is a powerful 3D spreadsheat that adds pages to allow instant consolidation.

InstaCalc" is a full power pop-up spreadsheat that lefs you cut and paste with your word processor.

PULIS: help screens, import/export 1-2-3 & dBASE, graphics, macros, sorting, liming, and much morel Outseder is 569.85, instacate is \$49.95 (Check/VSA/MC). FormalSoft (801)555-0971 80x 1913 Sandy, UT 84091 SINCLE 770 ON READER SERVICE CARE

BUSINESS PROJECT MANAGEMENT

PROJECT MGT, INSIDE 1-2-3

Project Calc creates projects on your 1-2-3 worksheel with 30 new @ functions and menus. Draw Gant timeline, PERT network and calendar on-screen or thru PrintGranh. Roll up. nement mosts into 1,2,3 burdonts and ask "what, if with schedule or costs, \$149.95 with 30-day

money-back guarantee FRONTLINE SYSTEMS, INC. P.O. Box 7408-PC San Francisco, CA 94120-7408 800.451.0303 Fet 55 916-677-7171

COMMUNICATIONS

COMPUTER-TELEX-LINK

Your PC can send and monive tricues quickly and easily with Computer-Telex-Link Reptace that aging telex machine! Add telex service to your business for cost effective worldwide communications! Computer-Telex-Link transforms your PC into a state-of-the-art communications tool for telex. Cawthon Scientific Group

24224 Michigan Avenue Deartorn, Michigan 48124 Phone. 313-565-4000

MULTI-LINE PC-DOS BBS The Bread Board System (TBBS) - Secure reliable, full-leatured commercial EIS for IBM XT/AT/386/PS2 or compatible Easily oustomized by non-programmers. Kermit, X & Y - Modern High performance allows up to 32 simultaneous callers User audit trail

300/1200/2400/9600 box eSalt, Inc 15200 East Gitard Avenue, Suine 2550 Autora, Colorado 80014

(303) 699-6565

COMMUNICATIONS

TAPCIS & PC-MagNet Fast, Easy, and Inexpensive!

TAPCIS is the complete communications program for CompuSeive and PC-MegNet. Think, read, type, and edit offine for free. Think, read, type, and edit offine for free. Then go online and see why PC Meg said it blasts messages onto the screen. (5/87) The lavorite among thousands of sawy uses and sysops, TAPOS has it al: a full-featured integral editor with WP/W commands, time & charges accounting. fast batch downloads, and more.

\$79 for disks, manual, and a free hour on CIS. No risk 90 day money-back guarantee. MC/Visa/check/approved purchase order (U.S.) Orders shipped thin 24 hours. Suppo rted on CIS in TAPCIS Forum (SO CIS then GO TAPCIS)

Support Group, Inc.
P.O. Box 1977 (PCT)
Baltimora, MO 21233
GSOU USA-GROUP
(201) 889-7893 CIRCLE 750 ON READER SERVICE CARD

SEND FAX FROM YOUR PC FOR \$39.001

Use the Xpedite service to fax documents in crystal-clear print direct from your PC to law machines around the world. Forget about printing a hard copy tirst and then warting for the far machine. Fornet about costly lax boards that take minutes in transmit every name and he unyour PC. All you need is an asynchronous

Electronic Courier Systems, Inc. 2 Industrial Way West Extontown, N.J. 07724

(900) 227-9379 or in N.J. (200) 389-3373

MULTI-LINE FUN AND GAMES Run A POP net 'social center' Up to 23 lines of chat, CB, games such as fraders, adventure,

mazer, skunk, Hars, poker, blind chess. Graph-ics for names (w/POP term). Mail and buileties. of course Sysop tools for accounts/housekeeping HW/SW for 7 lines is under \$3700. Users pay 60 cents/hr KINESIS CORP

3000 Circle Circle, Suite 212 Walnut Creek, CA 94598 415-932-1146(v) or 415-932-GAME(m)

MULTI-USER BBS (FOR IBM PC AT) TEAMate - a maintranse quality BBS. A mini

Compuserve Full screen cursor-controlled in terface, topic outline structure, public and priyete topics, audit traits, xmodem, integrated mail, content retrieval and more MS-DOS XENIX and UNIX versions. MMB Development Corporation 1021 No. Sepulveda Blvd., Suite K.

Manhattan Beach, CA 90266 (N CA) 213-545-1455 800-832-8022

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET .

CONSTRUCTION

COST ESTIMATING/BIDDING

Powerful, comprehensive system for building fast, accurate and competitive estimates. A complete, stand-alone program. Menu-driven very easy to use. Over 30 types of reports. IBM XT/AT and compatibles. Hard disk, 512K, dB III version with source code also avail. System \$245, demo \$15 (CA add tax), CK/MO/COO. CPR INTERNATIONAL, INC. 2038 Lake Shore Ave

Oaxland, CA 94606 415-268-1948

CONSTRUCTION MANAGEMENT Affordable, understandable sollware for build ers. Job cost, billing time and materials or percent complete, payables, change order and retention tracking in one package. Prints checks, statements, bids, 30 + reports. Clear manual & help windows, backed by our professional phone support staff \$795 YARDI SYSTEMS, INC. 930 Laguna Shee

CONSTRUCTION ACCOUNTING

The CMAS System is designed for contractors where tracking job costs is required. Modules include Job Cost, PR, A/R, A/P, GL, PO's, Inventory, Service, Dispatch, Estimating, Invol cing, and Report Generator, CMAS is fully integrated Multi-Terminals available. DATA BASICS

11000 Cedar Road Suite 110 Cleveland, OH 44106 (216) 721-3400

Santa Rarbara CA 93101

(305)066,3666

DATA BASE

OBLIGATION Call 24 hrs.

OON'T BUY CLIPPER" UNTIL . . you see our free dBASE Compiler Evaluation Kit. Contains a demo disk with 8 PRG's and the results of compiling with Clipper, QuickSilver, and FoxBASE PLUS. See for yourself how all three compilers work. Also 15 benchmark tests detailed brochures, and complete reprints of magazine reviews about all three FREE. NO



P.O. Box 2975 Oakland, CA 94618 (415) 652-2790



DATA BASE

reductive utility & setup make option nation option for dBASE programmers actor, Numeric, Date and Lepical fields orts up to 36 fields per application mails or quetom date screen formation Only \$69.95 • \$3.50 shipping & handling.

> Ferfare Computer Services P.O. Box 1415 P.O. Box 1418 Movine, New York 18747 CLE 760 ON READER SERVICE CARE

ROOTS II FOR GENEALOGY

Organize your family little and print camera-ready tamily books containing charts, lost and indices Sione, retrieve and display 1,000's of family facts h biographical sketches and source docu bition. Lightning-last searches and sorts 250 page manual. Satisfaction quaranteed. Write for free brockure. \$195(+ CA tax) COMMSOFT

2257 Old Middleheld Way, Sie A Mountain View, CA 94043 415-967-1900

DataEase 2.5 USERS A looket to provide DataEase users with the

capability to perform several unpleasant and formerly impossible tasks at the louch of a key Saves time, speeds development, aids documentalion, helps isolate buos, menu driven Requires IBM or compatible \$49.95 includes SAH check/MO JADA DEVELOPMENT CORP P.O. Box 8125 Soringheld, WA 22151-8125

SOL & OBE on dBASE & LOTUS dQUERY 2.1 is an interactive query system and report writer on dBASE and LOTUS files using

SQL (IBM 082 companible) & Query-By-Example its nice windowing facilities let users easily do ad hoc gueries on their dBASE and LOTUS Hes \$150 dOUERY/lib is a C-callable SQL lib (dQUERY 2.0 included), \$295. Add \$5. s.h. DUADBASE Systems, Inc. 1567 Keith Drive Campbell, CA 95008 408-866-0807

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115

RODE/PC from DPX

We enalthated all of the PC happed & as Bidd IV and the DRY comes done strend out as cinarily supernor Six of the ten largest companies in the U.S. have selected BOOE/PC. Call for on copy today

20924 Society Creek Blvd Suize 190-P Capertino CA 95004 (408) 973-9292

CIRCLE WAS ON READER BERVICE CARD

as changed . . .

nd Wadorf... Now even the most data entry is quickly moving to PCs er on one PC, or on dozene in a LAN, tryll provides a professionalge try system. Its ease of use, prod matched range of capabilities.

Isn't it time to bring your data entry up-to-date? KeyEntry III 1-800-533-6879 - 300 20-20 LE SET ON READER SERVICE CAR

DATA ENTRY EMULATOR You will not find any PC Data Entry System-FASTER, EASIER to use, or LOADED with more USARI F features, Distribution Worldwide. The FMILLATOR will meet your Data Fotoy needs-OR-return it with no obligation. PC or DE style

bestood Fully mean driven Price \$305, 30 DAY FREE TRIAL Also avail for IBM \$34/36. SOMPLIE

COMPUTER KEYES 21929 Makah Road IV. WA 96000 (206) 776-6443

VANTAGE DATA ENTRY DATA SPECIALIZES in Data Entry software hardworp support & offers the solution to your

PC-based data entry needs with VINTIGE software. Runs on standalone or networked PC's. Contains the most ADMANCED Issuures which are not combined in any other PC-based data entry system. Demo Prickages available Direct Access To Automation (D.A.T.A.) 303 Beach Road Burlingame, CA 94010

800-536-DATA or 415-342-8622

DATA ENTRY

VDE-Viking Data Entry Everyone is talking about The premier data entry system. Full-leatured to ce key punch & keydisks. Full screen "FORMS," double-key verify, wide variety of options, crossitoris, subtotals, balch balancino duplicating, statistics, skipping, etc. Character, field & record level validations, \$120-600 Also lor mine

VIKING SOFTWARE SERVICES, INC. 2815 East Skelly Drive, Suite 815 Tulsa. Okiatoma 74105 (918) 745-6550

DATA MANAGEMENT

FIND THAT FILE-FASTI ADAXIS GROUP has created the complete disk cataloging system. The Marsupial Collection ** pinpoints your disk in seconds and updates

disketle label pockets (palent pending) quickly Cataloger \$39.95, Labels (quantily 100) 31/2 \$20.00, SW: \$25.00, Bernoulli: \$125.00. \$2.00 handling (Utah residents add 6.25% ADAXIS GROUP

68 East Kensington Aven Salt Lake City, Utah 84115 (801) 486-6300

DESK TOP PURI ISHING

DESK TOP PUBLISHING

VENTURA AND PAGEMAKER USERS

CORFL HEAD NE creams income COPEL MEAU NO maintain unque headines stites (por oppinic embelschimerto for use ni vietusa or psychiates 1950 IS Win COPEL NEWFORM Tyou can strict, notale, gras, stades or shade Prostore Plus beis for use ni vietus 1916 US COPEL 1951/IRBA UTILISTE oudates Syra to print for single regional print of 1748/Heis pine easily region print grassings in pre easily region and opposition publicage. 1991 US COPEL SYSTEMS COMPORATION 1000 Carlon (Jan Coste, QOT MIC 2016) 1600 Carling Ave. Ottawa, ONT K12 7M4 (613) 728-6200

CIRCLE 500 ON READER SERVICE CARD Electronic Page Processing

> 1300 hi-res output up to 2540 dp: Dutput to paper or film ▶ Macintosh or IBM-PC/compatible disks

▶ 24-hour modern Complete Adobe type library a 24-hour teranson

 Free pick-up and delivery in I-88 Carrido Call 312/844-0030 DEE-SIGNER UNAGESETTING

A Aurora Ave., Aurora, IL 6050 26 Hr Computer Bulletin Board 3737544-0093 CRICLE 165 ON READER SERVICE CARD

OCR SCANNING SYSTEMS for PC/XT/AT/PS2 and MAC!

Our "Scanning Connection" products can reed text from measurings, as observed as a construction of the West Construction offer customers the lowest prices, best service and technical support.

Cell us today for the best prices on scanners from HP, CANON and PANASONIC. Dealer and volume discounts sysilable!

1120 KAIBAB • FLAGSTAFF, AZ 86001 (602) 779-3341 • TLX 705609

E FLAGSTAFF ENGINEERING

We don't do newsletters But if you're doing, 1,000-page technical documents, we're the

best-automated, style-sheet-driven, sophisticated pagination slick publishing features, and camera-ready output,

GML/PC™

The technical documentation and specifications specialist Command Technology Corporation, 1900 Mountain Blvd., Oakland, CA 94611 Telev:509330 COMMAND TECH

FOR MORE INFORMATION OR TO PLACE YOUR AD CALL 212 503-5115 . . .

DESKTOP PUBLISHING

VPToolbox for Ventura Publisher

File Management - VPToolbox instantly displays, prints, copies and diletes selected files or entire chapters or publications.

Chapter Documentation - No more guessing about chapter con-tents. VPToolbox supports user-supplied comments for each chapter. Also shows creation date, last print date, last archive date, and headers/footers.

Style Sheets — View style sheets or print descriptions of every tag for permanent documentation. Cross-reference list shows all chapters using a selected style sheet. Copy and delete tags, compare style sheets, see actual tag usage. VPToolbox has a quick windowing interface that works with or without a mouse. Available today for \$99. To order, contact your Xerox Ventura Publisher dealer, or call (609) 683-1237.

MAGE PROCESSOR

- For Word Processors and Desistop Publishers INTELLIGENT SCALING from the field of Artificial
- FULL PAG€ GRAPHICS—up to 9 pages at a time
- with only 512K of memoral . FULL IMAGE EDITING, not just what you see on
- the screen CONTROL CONTRAST, GREY TONES, FLIP. SCALE, ROTATE and more... 207 West 2nd Street PO Sox 6158 Lette Rock, RR 72200

SSOFTWARE

\$**295**[∞] PHONE (501) 376-2083

Desktop Publishers Int'l.

1-800-548-0386

Ventura Publisher \$469

Memory upgrades for HPS . . .

Panceton LM-300 monitors - Warboo at \$1596

PowerText BookMaker

print books, booklets, paperteacks, flyers, calendars on your lease rest. Resely to use bind, lotel and job, or camers ready for large press s. Withe a 400 page book with only se commands, print a single copy by to bind for SLTD at one you to bind for SLTD at one you to lot one SLTD at one see for SLD at piece. Address them an adatabase at 400 per hour. Turns ur lease printer into a printing press!

cludes the PowerTest Formetter, others for Automatic DeskTop Pub-ng, an automatic page layout pro-which out performs the top of the WYSWYG programs. Runs on any t competible. EGA, hard disk and use not required. Ready to publish rything for only \$305. For 14 page chure or to order, Call or write: Beaman Porter, Inc.

417 Halstead Avenue Harrison, NY 10528 (914) 835-3156 (800) 431-0007

עברית

عربي لادا ۱۲ DIPLOMAT SOFTWARE SERIES Use Arabic, Cyrillic, Farsi, Greek, Hebrew, Turkish, Urdu, Vietnamese, etc.. in popular software: WordPerfect, Dbase, WordStar, Spreadsheet, Basic, Prolog, Ventura Publisher, etc.. VN LABS

4320 Campus Dr., Suite 114 Newport Beach, CA 92660 (714)474-6968 Русский Eλλην

CIPCLE RIS ON READER SERVICE CARD LEARN OESKTOP PUBLISHING With VIOEDTUTOR 90 minute video base, 48 name workbook and example riskette. Learn Ventura Publisher or Aldus pagerraker quickly and easily. Clear comprehensive instruction Ventura users! Ventura store now coen, call for

free Ventura utilities and losts catalog and free Ventura files card WOEDTUTOR/VENTURA STORE 219 Ilihau Street Karbo HI 96734 808-254-6419

ENGINEERING

AOVANCEO STRUCTURAL OESIGN FAST. FULL. FLAWLESS. WAS \$785.00 NOW \$285.00

ONE COMPLETE LIBRARY OF ONE COMPLETE LIBRARY OF INTERACTIVE GRAPHIC PROGRAMS TO GESIGN BEAMS, COLUMNS, AND BOTH 20 AND 30 TRUSSES AND FRAMES, NORMAL OUTPUT INCLUDES CODE TYPE STRESS CHECK AND P.: EFFECTS IN STATIC

AND CYNAMIC ANALYSIS. FOR IBM OR COMPATIBLE SENO CHECK OR MO TO. SMARTCHILD & WHITEHALL LTD. PO BOX 803753 CHICAGO IL 6060-3753 ATTN: CUSTOMER SERVICE

ical Character Recognition (OCR) software converts printed typed documents into editable lend files for your desktop publishing system Supports HP Scan-Jet, Canon, Panasonic and most other desktop scanners Pre-trained for many popular lonts and trainable to read virtually any typestyle incl. tereign tents. Reads proportional lead

matrix printer output and Xerox copies \$385 Check/AMEX/VISA/MC/C00 Essex Publishing Co P.O. Box 391 Code Grove NJ:17909 (20f) 783-6940

CIRCLE 785 ON HEADER SERVICE CARD MACHINE SHOP SOFTWARE incorporates 6 options for estimating or for unproving productivity on the plant floor.

· specify-turning/milling feeds, speeds, horse · specify - drilling & reaming leeds, speeds · analyze - culting lool problems · calculate - X/Y coordinates from any ref · calculate - volumes/weights of metal shapes INCREDIBLY SIMPLE/EXTREMELY POWER-

FUL (FOR IBM PC/AT/XT OR COMPATIBLES) US \$299.00 CHKAISAAMC COMPLISTED PRODUCTS CORPORATION 1870 Bonhill Road Mintirgaugo, present Carnels I ST 1C4 (416) 678-1713 Fax # (416) 678-6300

ENGINEERING

STRUCTURAL OESIGN First, highly interactive, integrated programs for structural analysis and design of BEAMS, COL-UMNS, TRUSSES and FRAMES of any material. Easily mastered programs result in dramatic time savings white producing efficient, accurate designs. Specify PC, XT or AT and send \$25 for demonstration diskette to:

C-Squared B-Squared Software Oesign, Inc. 461 Bush Street Ste 220 Dect. A-2 San Francisco, CA 94108 415/391-7309

ENG/SCI GRAPHICS OMNPLOT(S) (screen graphics) & OMNIPLOT (P) (picities driver) provide integrated engineer ing/scentric 2-D & 3-D graphics with NO PRO-GRAMMING REQUIRED! Menu-driven, flexible. professional Choice of formats tabular line, contour bar, pe. 3-D wie lame & much more OMNIPLOTIS) \$195, OMNIPLOTIP), both \$295

MICROCOMPATIBLES, INC 301 Prejude Drive Silver Spring, MO 20901 (301) 593-0683

SIMILI ATION

GPSS/PC is a full-power version of GPSS, the most nocular mainforme simulation brosume Specifically designed for interactive use on today's high-speed microprocessors, it is loaded with features such as interactive prophics and animation Using GPSS/PC, you can predict the behavior of complicated real world systems. MINUTEMAN SOFTWARE P.O. Soy 171/8

Slow MA 01775 800-223-1430/617-897-5662 Ext.316

ENTERTAINMENT/ GAMES

TRAIN GISPATCHER TRAIN DISPATCHER is a realistic simulation of

a railroad traffic control center. It was created by designers of CTC systems for operating radroads and is used by some railroads in their dispatcher training programs. Available for IBM PC XT. AT and Jr. for \$35 + \$2.50 s/n. Color Graphics card required: MC/Visa accept SIGNAL COMPUTER CONSULTANTS, LTD. P.O. Box 18222, Dept. 33 Pritishumb PA 15236 (4)7) 655,7727

FOOTBALL WAGER \$25 WARE Don't buy a football handicapper till you call or write Rollen Robbie for Inse into Programs have

1988 schedule including pre-season. Built in database that allows an analysis the first week Free BBS support plus a wager summary. See pg. 512 of PC Mag. 9/15/87. Pro-Trueline or Major College \$49.95. J & R Software 523 Second Street



LOTTERY TRACKER AND WHEELERTM for ALL PDS SIX games when you choose from you. To Transland Stone past 1000 winning drawings and dates. Slowed numbers are analysed 4 ways—HOT, DUE numbers and RECRAFY designed on screen or printed charts. Select 5 leeting methods and choose one of 20 bill-1 propose WHELTING SYSTEMS Clock both or a wirring combination.

SYSTEMS Clock both or all wirring combinations and wheeling methods and wheeling methods.

Prints charts, statistics, numbers and wheeling systems. Why pay up to 599 for less? NEW IBMComp. \$34.95 + \$1.50 S&H

THE DAILY NUMBER BUSTER! TH

They said it couldn't be done! A complete softwere package for 3 and 4 digit daily numbers games. All of the LUTTERY TRACKER AND WHEELER leatures

including ALL straight and box bet combinations. Prints charts, statistics, numbers and systems. NEW! 6M/Comp. You'll love this software \$34.95

ENTERTAINMENT-ON-LINE, Inc. PO. Box 553 Dept. PON-Westborn, MA 01581 VISA & MC call 1-800-824-7888 Ext. 283

CIRCLE SIT ON READER SERVICE CARD

SPORTS HANDICAPPING SOFTWARE

\$\$WIN with thoroughbred/harness &

greyhound handicapping software-\$52.95

each Up to 13 entries analyzed class, speed,

times, odds, track, post, stretch, & finish. Pro

Football, Baseball, Baskelball Sollware-

\$52.95. Handican races & rames in minutes

(313) 626-7206 Orders 1-800-527-9467

PRO FOOTBALL HANDICAPPER

Get the winners edge! PC-PICKS is the best

NFL software you can buy, regardless of cost. If picks point screads using adjustable formulas. and lets you view or print stats in 62 calmoories.

Enter stats from boxscores, or get them EREE by modern from our BBS/ \$34.95 (\$6.95 for demo) MC/Visalthiamone MICROBROTHERS

Order anytime at 1-800-628-2828 ext. 865

MC/MSA accorded. Free into

SCIETWARE EXCHANGE

W Bloomfield MI 48033

P.O. Box 5382-PC

ENTERTAINMENT/GAMES



"If you are interested in Go, buy this program." Jerry Pournelle, Byte 7/87 Why do the Japanese show Go on prime time TV? Learn why they have been addicted to this game for millenia.

NEMESIS", the world's strongest Go program, is the ideal tutor. Packed with vital feaching featuras, NEMESIS" even tells why he makes his moves! To order call 617-890-4184 or send \$79 for Nemesis or \$125 for Nemesis plus optional 1000 + Joseki Tutor + \$3 S/H

The Go Master Toyogo Inc.
Toyogo Inc.
Toyogo Inc.
Toyogo Inc.
Toyogo Inc.

ADULT SOFTWARE 20 wol CGA / 10 wol m

20 vol. CGA / 10 vol. monographics, 5775 roif's largest collection! 5775 roif's largest collection! 20 vol. set 8995 e - Monographics, 10 vol. set 849.95 Free Catalog! VISA/MASTERCARD You must be 21 - plasse state age. 60

Adult Software For BIM PC, XT, AT, PN 2 & Competibles GRAPHICS CARD NEEDED

\$16.95 ppd Volume III New Series M1 thru M7 \$5.00 eech ppd Catalog Diskette . \$4.00 ppd

AOS PO Ann 216 A CINCLE 755 ON READER SERVICE CARD

RUN COLOR GAMES

on your mono monitor

Works with any managraphics card. Runs most at CGA programs, even self-acoding ones. The best performance for your more XT or AT system-works great Reselbs: and very usable-even for fast moving parses. These Work: BASICA, Fight Servision, GRASP, PACMAN, ZACKON, LODERUNNER, PrintShop, etc.

\$29.95 00-0010

1-800-854-0581 ext 854 (orders) State engang CA not act ST 40 MCVCA Wilkinson Software

6400 Westminster #115, Westminster, CA 92683

LOTTO NUMBER ANALYZER Fast service on V/MC & MC SOFT-BYTE (\$13) 278-1110 F.O. Box 108, Furest Po Dayton, Olf 45401

HOW GROSS

RAM Resident Jokes for IRM Compatibles. Pops up over and back down any application software. Hot-key activated Hundreds of jokes and fun per disk

> Indicate choice Adult and Tasteless Jokes · Clean & Fun Jokes · Three-Trivia Strange Facts \$19.95 per Disk - All 4 \$60.00

VISAMO ZEETEK COMPANY 536 23rd Avenus North St. Petereburg, FL 33704 (813) 821-5297

CIRCLE 752 ON READER SERVICE CARD

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

FINANCIAL.

HFS - III Home Finance System

Saves time Saves money Simplifies taxes

· Designed especially for

home use.

* Menu driver · Simple checkbaok-style

· Manages checking, churge accounts, IRAs and more a Prints expense, deposit and

total financial summaries, or selected transactions · Prints checks on your format, with payee address

Pop-up meees and help . Macro keys and model

transactions for speed and convenience.

a Fast awembly language · Not copy protected. New year \$99.00, includes shi ping in Iowa, add 4% sales tax. VINA. MasterCard accepted.

Jay Gold Software, Inc. P.O. Box 2024 Des Moines, IA 5831P (515) 279-9821 3 (800) 541-0173

PFROI! S20 Super Portfolio Manag

 Stocks/Bonds/M Funds/Dpr Asset
 Bat & Alt Tax ROI (IRR method)
 Div & C.G. Reinvestment/Tax Lots
 10+ rpts, CGA & Hercules graphic Or also with CAPTOOL: \$79... DJ. Compuserve. & GEne proing
 Multiple portfolio batch ops
 Bond swap YTM & stock valuators
 Client stress, pirel p & screens IBM PCs/PS-2 \$3 S&H Chk/VISA/NC 45-day money-back guerannee

TECHSERVE, inc. (206) 747-5598 POB 70056, Bellevue, WA 98007 CALL 1-800-826-8082

Financial continues . . .

Lalavette, CO 80026-0339 FINANCIAL

P.D. Box 339

Charting Software MetaStock" \$195

Demo Disk-\$5 Demothics Demo Disk.—15°. Perform sophisticated technical analysis on stocks, redust funds, commodree, etc. Festales multiple models emotions, unlimit moving averages, 20° pits self indicators, trendings and trading bands, overlays and pressure, plus more Compatible with 12° major data selvices. For complete limitating, and tool-live.

1-800-882-3040 EOLISC International Inc. Box 26743 S.L.C. UT 84126 (801) 974-5115



FINANCIAL

"I was impressed. 1 Was surpressed. It (MONEYCOUNTS 4.0) wins the cost-effective award. John Dvorsk, Ft. Magazine.

Now Version 5.0 atto

estimates your 1988 income tax
 araivzes filancing options.

Now there's MONEYCOUNTS * 5.0... an unbelievable buy at

iust \$29! Easy-to-use CPA-designed money management accounting gram for home and business MONEYCOUNTS * 5.0 gives you cash, checking, savings & credit

way look-up, inquiry reports, on-line help, printed manual Handles up to 999 accounts and

100,000 trensactions. Not copy

savings programs computes interest rares, loan payments prints amortization · manages mail lists-zip and alpha sorts-and prints labels

and index cards fiscal year support, and pop-up balancer, budgeting, financial Call or send \$29 plus \$5 shipping handling, Check VISA MC-COD ancial data base with thre



Dept M • 373 Collins Road NE - Cedar Rapids Iowa 52402

E•Z•CHECK PLUS

des all types of transations, over any time period. Provides lessant access

to all transactions tup to four billion records. You will not outgrow this program! to 63 user-defined accounting codes for quick, accurate cash-flow analysis and general accounting. Makes tax preparation a breezel

matically addresses and prints checks. Pay bills in seconds ck your bank statement in minutes with special quick-reconcile feature

Yests exey-to-understand statements and checks in two different styles Friendly design and extensive pop-up help screens make E-Z-Check Plus a loy to usel Comes with complete documentation and free unlimited technical support.

800-258-5749 Mon-Sat: 10:00 AM - 9:00 PM Call now for same-day shipping (Visa/MC) 64:95 + 5:00 shipping and handling is resistence and 3% Requires hard disk & 256K RAM Not copy protected

CDI Microcomputer Systems • 2205 Decker Bird. • Columbia, SC 2920

WANT THE GRAPHIC DETAILS? Send \$10 check for demo version of SPLOTI

Plots up to 100 portofolios/stocks. Imports data from Dow Jones News/Retrieval, X*Press. CompuServe, integrated editor Automatic forasom 1 year-9 trading days. Needs EGA/256Kb equipped IBM PC compribles whard disk Complete version, \$90. 1 mp. money back Data Base Associates Deal P

&10 Richards Street, Suite 901 Honolulu, Havaii 96813 (808) 521-6459

LOAN PLUS

Fully menu drivent UserFriendly! Organizes all phases of Loan Processing. Easy to leack payments Optional Rule of 78 Produces Amortiza tion Schedules, Payment Receipts & Invoices Call Mulkos, Diel of You Selements, Lam Collection Report, Labels, etc. PC/MS DOS/256K Demo \$9.95 Operating System \$995 ADVINCED PERFORMANCE Inc.

o'o The Software Place 156 Bay Area Blvd. Webster, TX 77598, 713/338-2546

PC MAGAZINE . AUGUST 1988

Introducing Andrew Toblas' Financial Calculator™ The program that provides quick answers to all your financial questions

Andrew Tobias' Financial Calculator" from the best selling software Managing Your Money' answers questions on:

- . College and retirement planning . Effects of new tax laws Compound interest cate
- Mortgage refinancing · Loans and annuities
- Investment analysis . Buy vs. rent vs. lease · Internal rate of return
- · Rental property analysis And more!



For 256K IEM PC or compati Only \$44.95! Order your copy today by calling (203) 222-9150 (\$2.00 refund for toll calls). Mention this ad and receive an additional discount!

MPC4: 355 Riverside Avenue, Westport, CT 06880 COCKETTO ON DEADER SERVICE CARD

LOAN AMORTIZER + TAX TIME A DRAG? Excamort Loan Amort's simple/complex, extra

ownts, points/fees, APRs (Per Rep.Z), balloons, solve unknowns, welds/RR, PV, FV, store/ retrieve, more IBM PC/XT/AT/PS2/compal Great for client services. Acclaimed nationwide by Banks/Legal/CPAs/CUs/S&Ls/R.E. \$149.95 + \$5 s/h Visa/MC/AmEx, 60 Day MBG ELECTROSONICS 36380 Garleid #1 Fraser MI 48026

(213) 594-4202 800/858-8448, 313/791-0770

Start now for next Agnil Collect/organize to

data as you pay bills. Get one-time entry for "Tex Oate / Oate Sensitive Notes "Check Registers / Bank Reconciliation Check Printing / Recurring Payments THE TAX COLLECTOR - \$68.95 VERIFIED SOFTWARE PRODUCTS 4573 Dogwood Avenue Seal Beach, CA 90740

FLOWCHARTING

Flow Charting II+

The New Phus for Fast Flowcharting

FLOW CHARTING is new! It's now Flow Charting I+, with more speed + more functions + more printing ontions

 10 text fonts; 26 shapes;
 Line mode can stop at a shape;
 Backspace key can ersee a line to its origin.

• Free text entry anywhere, or select

auto-centering: Vertical or horizontal printing: one chart or multiple charts. Used by Feirchild, Bechtel and more than 500 other major corporations. Edit quickly and accurately - even major edits with Flow Charting II+, the Specialist. See your retail store or call:

PATTON & PATTON

1800-525-0082, Outside Callin 408-629-5376, California/Int l CHICLE 751 ON DEADED SERVICE CAR

TurboFlow \$39.95 -::2

 Curves, ellipses
 Any size symbols
 Automatic "PAN" to seen drawing Automatic "PAN" to seen drawing User defined Library
 Hercules monochrome, CSA, ESA
 ISM/EPSON, NEC, OKIDATA printer
 HP/GL, SM/PL, Sweet* plotters
 Poper size to 34" x 44"
 Foppus menus

VERTOR

L. 1-214-669-2137

Lama levidents and different and all dates levidents and all dates levidents and all dates levidents are sent at several assert of arthropology from Electronica Inc. 610 5. Sherman, F104,
Richardson, Tx 75081 CINCLE 781 ON READER SERVICE CARE

Flowcharting

continues . . .

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

FLOWCHARTING

BETTER FLOWCHARTER

Know before you buy! EASYFLOW is the superb Nowcharting program chosen by over 30,000 users, and very two ably reviewed in the March 10th 1987 issue of PC Magazine. See the "index to Advertisers" under HAVENTREE to find our large display ad in this issue. Now available with 30-day MONEY-BACK quarantee nTree Software Limited

Order Desk 1-800-267-0668 ation (613) 544-8035 Teletax. (613) 544-9632 GENERAL.

14 FOR \$1361 SofPourn is a set of 14 useful programs:

· Planning calendar · Graphs without graphics · Spelling checker · Accounting reports · Configure printer, keyboard, anything

And more! Only \$136 FREE Brochure Craig Banning Route 3, Box 317 Big Pine Key, Florida 33043 (305) 872-3817

GRAPHICS





TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115

GRAPHICS

GRAFPLUS Power Pack Your PrtSC Key!

Grafplus" turns any IBM or compatible graphics application

into a powerful communicator by printing exactly what you have created on your computer screen. Print in color, black-on-white, white-on-black

- Scale the image to any size
- Print vertically or horizontally Work with virtually any bit-mapped
- dot matrix, laser, or inkiet printer Link into Pagemaker or Ventura

Seattle, WA 98U6 206-937-1081

Ourango, CO 81301

Rochedox NY 14623

(7)E) 424.5300

DYNAMIC 3-D GRAPHICS FAST GRAPHICS IN BASIC Using the lastest video driver multines ever written for the IBM PC, ACROSPIN allows you ROOSTERGRAPHICS v.1.1. Create Graphics to dynamically rotate, translate, and scale 3-0 CGA EGA VGA, or Hercules adapters. Graphics primitives, page swapping, enlarging, fast windows, menus and much more. For DuickBASIC wie harre objects and point clouds. Works with most CAD Parkages, Supports CSA/FGA/ MCGAVGA/HERCULES on IBM por frough RASCINA Turbo RASIC in Assembly \$65.00 PS/2 530 + \$2sh (+ sales tax for CA rest + \$100 eth Alen for C Sunctoud Software 555 South Carrino Del Rio

P.O. Box 1302 Monto Park, CA 94026-1302 415,329,0542

GRAPHICS LIBRARIES

Very Fast 2-D & 3-D Autoscaling Grap Fortran & Pascai 3-0 Lines Use Color for Z-Axis. Fast Polygon Fill with Culouts, Solidi Wireframe. Many Fonts, Color/Blinking Text. X-Y. Bar. Contour & Fighnet Graphs. Drivers for Dot Matrix/Laser Printers, Pen Plotters, CGA. GA & VGA 1/0 Port Control \$140 CHIRP TECHNICAL SERVICES P.O. Box 551

Del Mor CA 92014-0951 15101-250_5896

(301) 593-0683

FORTRAM/PASCAL GRAPHICS GRAFMATIC (screen): Microsoft Fortran/Pas cal, R-M. Lahey callable roulines. Graphics primitives, total 2-D plot support, 3-D plots and port HPH plotter PLOTMATIC, Laser, dol matrix printer? PRINTMATIC, 135 sa. Any 2. \$240, all 3, \$340. Ask about our 15 lonts. MICROCOMPATIBLES, INC. 301 Phelude Drive Dept. PC Silver Spring, MD 20901

FAST, Revible, easy to use, compact T-S-R utility to send screen graphics to your 9 or 24 pin dal matrix, ink jet, or lazer printer Create quality bits or color printer graphics from applications AND user written programs. Full 24 pm support. Many options. Complete driver

library \$39.95 RAINBOW TECHNOLOGIES 8106 St. David Court Springfield, VA 22153 703-440-0064

HEALTH

PC-RFI AYO

Only \$49,95

lewell Technologies

lects & Graphics-Based user interfaces using

35mm SLIDE FROM YOUR PC COMPUTER SLIDE EXPRESS convers gra

4740 44th Ave. S.W.

Suite 203

Finally A Program That Califes You Down Shapes, Colors, forms, continually changing images, non-repeating, abstract & realistic Self-driven or interactive, relaxes and/or stimulates according to mood, eases littld nerves "Monitoritis" in office/home Reviewed by doc-tors. Needs EGA/CGA/MonoGraphics. \$39.95 + \$3.00 S&H (+ N Y Tax) VISA/MC TRUE IMAGE

P.O. Box 660 - Cooper Station New York, N.Y. 10276 (212) 777-7505

ANALYZE DIETS, MENUS & to much morel with The FOOO PROCESSOR III This TOP-rated software has the best database

of any system on the market loday! Acclaimed by schools-colleges-hospitals-homes-fitness centers & businesses 2400-3000 foods-30 nutrients \$250 IBM-Apple-Macintosh CALL OR WRITE TODAY FOR FREE DEMO DISK **FSHA Respond** P.O. BOX 13025

SALEM, OR 97309 (503) 585-6242/7755

OIETWISE/ENERGYWISE For Olet, Nutrition, Fitness conscious peop · DIET Evaluation (children and adults) MENU Aralysis · RECIPE . BODY COMPOSITION

 ENERGY EXPENDITURE MS/DOS \$39-\$120 (profession nal yers, avail) **MUTRITIONAL DATA RESOURCES** PO 8m 540

Willoughby, Ohio 44094 800-NDR-DIET Dhip (216) 951-6593

files produced on the IBM PC into brilliant 35mm. color slides with color resolution 400% better than your mornitor. Leave your printouts behind

Use high respiration color slides up to 4000 line. COMPUTER SLIDE EXPRESS \$9's lob. VISUAL HORIZONS 180 Metro Park

BAR, LINE & PIE CHARTS with CRAPHX. From simple to complex, incl. inn 3-D effects. And you can add your own labels and notation to graphs Easy to use. Great for presentations. User manual Supports EGA, Ino \$49.95 + \$3 S&H. Brochure analable VISA or MC, Call 24 hrs/day, 7 days/wk WRIGHT SOFTWARE

4006 Tall Oaks Drive Blacksburg, VA 24060 703-951-3314

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

INVENTORY

*** dFELLER INVENTORY*** A business inventory program written in modifia-ble dBASE source code. The menu-driven pro-

cram lets you locate terms by inventory name or number. It keeps track of morder points, vendors, average cost & other information.

" dFELLER inventory \$150 Requires dBASE first
" dFELLER Plus \$200 with History & PO's. Requires dBASE III-III PLUS (for stock rooms) FELLER ASSOCIATES 550 CR PPA, ROUTE 3

Ishperning, MI 49649 *** (906) 486-6024 *** INVENTORY MANAGEMENT

Stock-Master 40, commercial grade system

provides Stock Status, Purchase Order Writing & Tracking, Trend Analysis, Quality Control Reporting Detail Analysis, Bill of Materials, Multi Locations and more Modular, "micro" priced & configured to your needs. Cobol Source agritable: APPLIED MICRO BUSINESS SYSTEMS 177-F Riverside Ave Newcort Brach, CA 92663 (714) 759-0582



INVENTORY

MANUFACTURING INVENTORY \$99 ory control with Bill-of-Material Pro and vendor file for small to medium size batch manufacturers or job shops. Project material unements, allocate material, maintain material cost per work order and for all WP. Allows up to 3 remote terminals to receive or issue mate Meets supplier log requirements of MIL+45208. REAL TIME AUTOMATED, INC. 1340 B No. Dynamics St. Arabem CA 92906 714-993-0111

LEGAL

L-PLOT...
A Metes & Bounds program to plos/print plats of any scale. Any description- use Any measurement Calc areas, error of closure, plots multi tracts. IBM/compat with monographics, CGA or EGA capability \$190. Or send \$15 for real working demo, refundable with order. Visa/ MC/chk. Free info. LAN/SCAN, Inc. PO Box 5863 Abriene, TX 79608 (214) 824-6419

MAILING PROGRAMS

MR. PARCEL UPS SHIPPING PROGRAM

UPS approved easy to use shipping program Prints COD tags, labels shipping manifests For PC, XT, AT, PS/2

compatable computers \$389.00

Freeman Software Garland, Texas 800-426-6598

CRICLE 706 ON READER SERVICE CARD POSTWARE MAILING SYSTEM

male mail preparation. Cut postage costs by 5¢ per piece or more. Only PostWere prints address labels in bundle and bon bulk mailing order Not a useless aip code sort. Prints address labels, bag tags/tray labels. Calc postage Works with dBase III PLUS, DATAEASE. Base, Smart & others Also ASCII. . 1st & 3rd Class-\$195 . 2nd class-\$395 * Carner Route-\$300 * Dup. Detector-\$200 PostalSoft, Inc.

515 Division Street La Crosse WI 54501.4544 608/784-3500 800/831-MAIL (5245)

MAILING PROGRAMS



y Zip Code MAIL. By Search Codes MAIL MERGE: ord Star, Word rect, MS Word. MONSTER

dard ASCIII

rintouts — Federal

And

UPS, DHL

Takes The Bite Out Of Mailing Lis For Any Size Compar BRITTAIN SYSTEMS, INC 3457 Normandy #3 - Dates, TX 752

4" × 11%" — 1 across 4" × 16" — 2 across 216" × 16" — 3 across Name Badges: 316" × 20%" Shipping Labels: 4" × 216" India 3" × 5" Post Cards: 316" × 6" Rotary Index Cards: 21% × 4"; 3" × 5"

FEATURES: Written in OBase III • Compiled in Clipper • Source Code Included • Totally Menu Driven • Integrated • Excellent Manual • File Import/Export

Price \$100° + Sales Tax (214) 528-3020 VISA, AMEX. MC. Accepted

OOCTOR OATA LABEL VI.2 Complete & easy-to-use menu-driven ma

FREIGHT BILLS: Bulk or Individua

CIRCLE 823 ON READER SERVICE CARD

list manager dBASE III compatible files. Bulk & CAR-RT SORT Index. filter sort & print in any order, Mail merge, duplicate checker, & much more. Two versions available. Unlimited records per file for \$79 + \$3 SH (\$82) or 250 records per file for \$3. Call or write for more

DOCTOR DATA SOFTWARE P.O. Box 11366 Phoenix, AZ 85061-1366 (802) 246-8907

THE MAIL ORDER ACCOUNTANT Order fulfillment List management. Includes omer lists, labels in 6 formats, inventors nvoicins, accounts receivable, customer paynents by cash/credit card. Prints shoping labels, credit card slips, UPS shipping manfests, sales has report. dBase III Plus source code provided \$975, demo \$25 + \$350 S.H. GOLDSMITH & ASSOCIATES 48 Shartuck Square, Suite 86 Berkeley, CA 94704 (415)540-8396

"THE MAIL ORDER WIZARD

is one very powerful program. It offers a catal business all the computing routines it need and then some! gives new meaning to the hackneyed phrase, 'user friendly' . Written in Assembler, if operates with lightning speed very serious software, a 'musi see Catalog Age \$970, Deme, \$12. The Haven Corporation 802 Madison Dept. M ston, IL 60202 800-782-8278

THE TURBO MAIL ORDER MANAGER The userhiendly answer to mail phone sales

214-840-9313

(40th 738-068

(313) 347-9600

ndles all charge card hoes and cash sales Includes sorting for printing credit card slips mailing labels, shipping labels, sales tax renorth, invoices, sales summery and customs base summaries. Custom service av Only \$190 + \$3 sh, VisaMC/AME MTN Inc 1422 Pine Hill Onve Gartand, TX 75043

MANUFACTURING

MINIMIZE PRODUCTION COSTS Enter your company's operational costs, curre status, and sales forecast for up to 156 time penads PMQDEL finds production rates, inventory and employment levels for each period such that production scheduling costs are minimized WSA/MC Also Linear Transportation. & Upper Bound Programming Best Way Software PO Box 9656 Worwick, RI 02589

THE FOREMAN Multi-user Now Assistin Invertory 83M/PG/Costing · MRP/Invoicion/Ad hot proofs · Repetitive mig or one time build · Extensive Cost Control: Standard vs. Actual Automotive release interface . IBM PC/NOVELL/ALTOS OCM COMPUTER PRODUCTS, INC. 43700 Twelve Mile Road Nov., MI 48050

MEDICAL.

XL1™ A Complete Soluti XL1" is a full featured Practice automation system Some of its many features: ·Insurance claims -

electronic & paper Complete patient data & recall info

 Billing - patient, account, point of service Full financial reports daily, monthly, annually

 Supports 15 physicians References provided Support lines open 9AM. to 9PM EST Mon-Sat

•90 day full refund if not completely satisfied Full featured demo - \$75

credit towards purchase \$1450 includes 1" year of support/enhancements Practice Management

Systems, Inc. 9450 Two Notch Road Columbia, SC 29223 1-(800)-521-7217 CIRCLE AND ON READER S

Medical continues . . .

DMT 6 1944 4547 - 从47分别的, 75775-358的条件



MEDICAL

PC brings you the best of both In: the power and flexibility of MOX cal-office software is a PC-DOS at. Flexes for any specialty; ges billing, slectronic claims, m records, medical records, mer If upgrade poth to MEX with IX/Xenix, Call for into and tree

150 H. Suesyslope Rd., Breekfield, W1 53001 (800) 558-2298 or (414) 782-6300 CLE 756 ON READER SERVICE CARD

MEDICAL SYSTEMS WITH ECS All PPM products have electronic claims sub-mission (ECS) to Medicare & commercial carriers, paper claims too . PC . CLAIM \$89.95, claims only PC → CLAIM w1CO's, CPT's & HCPC codes

· PC · CLAIM PLUS claims only wipation! file. Complete a claim in one minute \$459 . THRESHOLD . TM \$1,995 00 clams. AR refeet billing

. THRESHOLD \$3,995 00 claims A/R patient billing, complete practice management, statis-· CLAM · NET Nationwide claims clearing house Full 100% credit on product upgrade PC • CLAIM & PC * CLAIM PLUS both house

30 day money-back guarantees. IBM PC/XT/AT correctibles MS-DOS 256K YSICIANS PRACTICE MANAGEMENT 1810 South Lynhurst Suite Q Indianagolis IN 46241

In continental U.S. call (800) 428-351S Medical/Dentel Systems Second Decade Support for more than 130 machines Featuring paper and electronic claims, patient billing, appointments, diagnoslic data base, word processing, financial histories, payroll, accounts payable, and general ledger Single and multi-user systems. Starting

at \$199 95 2,400 Dealers. CMA Mires Comorde 55888 Yucca Trail #6 Yucca Valley, CA 92284 619/365-9718

COMPUMEDIC" PROVEN Practice Manage

(317) 634-8060

7 yrs. Electronic claims, AR, G/L, statements, insurance forms, practice analysis, word process ing, recall, delinquent tracking, historical data FLEOBLE user designed forms/reports \$4400 Training axell. Dental (DentaWare**), eyecare. optometry (CyeMate **) & Vet. (Wel.ogic **) also avail Dealer inquiries invited DATA STRATEGIES, INC. 17150 Via Del Carroo Svite 203 San Diego, CA 92127 05150, 451-0450

DRe/ASSISTANT HAS IT ALL!

Profit with the most complete software for PCs. Superbills, A/R, insur forms, Problem Oriented sical Records, productivity, scheduling, recall, MORE MD written, proven over 7 yrs. Only \$999 Larner canacity baser DRs/MANAGE MENT \$1495 Networking \$1995, FREE DEMO CAN YOU AFFORD NOT TO TRY IT? MC/VISA MEDSOFT OF CALIFORNIA INC. 13588 Samantha Avenue San Diego, California 92129

Toll free (800) 541-0900 MUSIC







PC stondard MIDI Co Processor MelodEase Plano Roll Composer Easy 8 Multi track Recorder nth Sound Manager Soltware \$219 with MIN with

Music Quest Inc

MUSIC



TECHNOLOGIES

333 FIFTH AVE, Dept C, **PELRAM, NY 10803** THE REAL PROPERTY. (814) 738-4500 ROLE 714 ON READER SETWICE CARD

MIDI Cerd and Softwere MIDI

Software and Hardware For only 189! e Plays direct from hard disk Individual track looping

a IRM PC's and compatibles Midt In/Out And Metronome (214) 238-5269 (800) 456-MIOI Cubies Included

· IBM PC's and compatible List price \$199
 To Order, Call 1-800-543-3268 ninent Functions, Inc LE 636 ON READER SERVICE CARD

COMPUTER MUSIC CATALOGUE!

Largest music software selection anywhere! 80 pages of detailed information on the leading computer music products including wavele editors, transcribers, sequencers, MIDI interfaces & more. Get the facts! Competitive prices! Visa/MC Worldwide shipmen | Send \$3 for 2/yr catalogue subscription DIGITAL ARTS & TECHNOLOGIES

Dept PC1, PO 8ox 11 ord. CT 06460 (203) 874-9080

FORTE I/II MIDI Sequencers 16/32 Iracks, 16 channels/Yack Record/Play

back 60,000 notes Most powerful MIDI edit ing Rhythmically Illevible Step entry Auto Punch, quantization, realtime playback control, DOS shell. New in FORTE II System exclusive storage, unlimited looping, SMPTE cue list Sonolist, Accelerated \$150/\$250 LTA Productions

P.O. Box 5623 Harnden, CT 06517 (203) 787-9857

PC MIDI Interface Card, Sequencer Softw

and 4 MIOI cables (1 in, 3 out) ONLY \$149.95! 64 tracks 60,000 events, 800 ticks/ptr note resolution! Fast, full featured, easy to use software Best MIDI offer ever made! Developer's source code \$19.95 Dealer inquiries welcome

MIDI MUSIC 500 Fast Aracaho, Suite 609 Richardson TX 75080

UNLEASH YOUR MUSICAL GENIUS " COMPUTER MUSIC SYSTEMS! " "MUSIC SOFTWARE all computers for music printing, composing, home recording

MIDI SYNTHESIZERS ETC.I "SEMINARS & FOUCATION For a free catalog or into call write visit. MUSICATION

1600 Broadway Suite 1000A (W 48th Street) New York, N.Y. 10019 212-957-9100

PC Music Co. (800) 634-7249 Don't get sluck with a loy! PC Music offers a wide range of name brand music hw and switt lum your PC into an awesome recording studio

Let an expert match your needs with the right equipment at LOW prices. Nowice or Pro-Create! Publish! Perform! Call day or night. PC Music Company PD Box 34315 Bethesda, MD 20617 (800) 634-7249

SONGWRIGHT IV

Music Processor prints professional sheet music, songs, scores with lext, chords, symbols. Compose, edit, coox, record, transcribe, play transpose to any key Bass/treble, multiple staves all meters MIOI optional IBM/Epson/ Star printers, CGA/Hercules graphics \$89.95 Send for free sample output SongWright Software

Lovetleswie, VA 22080 (703) 822-9068



OPERATION SYSTEMS



for the IRM* PC, PC/XT and PC/AT

- No royalties
 IBM PC DOS* suppo
 C language support
 Preemptive scheduler
- Time sliging available Intertask message passing Oynamic operations
- memory allocation Event Manager
 Semaphore Manage
 Source code of the
 C interface and den
- Demo package \$25 US Manual only \$75 US AMXX6 system \$2105 US

KADAK Products Ltd. 205-1847 W. Broadway, Vancouver, B.C., Conada V6J 1Y5 Tel: (604) 734-2795 Telex, 04-55670

PREVENTATIVE MAINTENANCE

Memory Minder

Memory Mein he mot compelensive drik diagnostic program, available for moccomputer, how operate caraquicky and cash check the vital operating naturation and the compelensive control of the best alignment. That destroyed on the Run Henory Hinder before vital data backers. Run Henory Hinder before vital data services. Run H. L. S. Z. V. 40 track 5.25° 80 track 1.2 Med A. F. a. S. 25° 40 track 6.25°.



MAINTENANCE & INSPECTION

An easy-to-use computerized method to organize, operate, and control an effective preventive maintenance system. Applicable to any type of business or industry. Full screen input and displays. plus function key help command. Maintains hislorical data, creates work orders, and provides numerous reports. For info, write to: PENGUIN COMPUTER CONSULTANTS P.O. Box 20485 San Jose, CA 95190 (406) 997,7703

PREVENTATIVE MAINTENANCE

TURBO

Maintenance Manager™

"The User Friendly PC Software System" Now, you can justify equipment repair and replacement with facts, not simply opinions. The user-freedy maintenance management system for processing work order and equipment data records. Incresse your rization's productivity and reduce O&M costs with the following feet

Software Features Lightning Fast



 Parts inventory and reordering · Work order processing and · Employee work load leveling Vendor records · Dirty Dozen's ma prontes Over 30 records

Produced by the O&M experts for IBM PC, XT, AT, and compatible computers For more information contact: (303) 969-9393

Owen Engineering & Management Consultants, Inc.

5353 West Dartmouth Avenue • Suite 407 • P.O. Box 27749 Denver, Colorado 80227

PROGRAMMERS TOOLS

Turbo Pascal Programmers! Blaise Computing, dedicated to providing quality software development tools since

1982, supports Turbo Pascal 4.0 POWER TOOLS PLUS ◆ TSR tupport

Direct video access
 VGA and EGA support

· Windows and menus DOS memory allocation

Both packages include source code, a comprehensive user reference manual, extensive examples and full program samples on the distribution diskettes. Blasse Computing that a full line of products for Microsoft C and Pascal as well as

 Hardware handstaking
 XModem with CRC Comparing made of use made and the Computing INC.
Cast 600-203-8867 billing Computing INC Cast 600-203-8867 billing Computing INC Computing Inc.
Cast 600-203-8867 billing Computing Inc.
Cast 600-203-8867 billing Inc.

ASYNCH PLUS

Interrupt-driven
 Speeds to 19 2K band

Four parts on PS/2 systems
 XON/XOFF protocol

PROGRAMMERS TOOLS

FREE BUYER'S GUIDE

Guide-containing hundreds of languages, utilities and applications specifically for IBM personal computers and compatibles. We're the world's leading independent dealer of programmer's development tools because we provide sound advice, low discount prices, fast delivery FREE nestic shipping and no hidden charges. Programmer's Connection 7249 Whopie Ave MW

North Canton, Ohio 44720 800-336-1166 USA 800-225-1156 Canada 215-494-5250 F/UX \$15-494-02007A

SOURCE CODE

bly and C source code. Many programs ere memory resident. All will run on any IBM PC, XT, AT or com-

Dir/File Manage DOS Anywhere Write or call to order source for these or other programs. Demo disk and

SaySoft 10301 Lake Ave. Suite 617 Cleveland, OH 44102 CIRCLE 757 ON READER SERVICE CARD

TURBOCHARGE YOUR KEYBOARD EXPERT KEY saves you keystrokes. Type long words ighrases only once From then on you

only need a low keystrokes. It's all automatic No macro keys to program or remember. Just a single Hol Key How? Expert Key LEARNS you words from the keyboard and screen. As you start highing a word, a highlighted quess poos up- a smart guess, right at the cursor Just hit the hot key and the word is complete, or keep house and the ouess is opner It's lun & never gets in your way Learns editing sequences and recalls previous command lines 30 day guar for PC/XT/AT \$65 SPECIAL (Reg \$95) + \$3 S&H, CA res add 6.5% Newell Technologies, Inc.

27758 Santa Margarita Plvwy Suite 330N Mission Vielo, Cal. 92691 (714) 583-7848

TURBO PLUS \$99.95 Programming tools for Turbo Pascal 4 0 Screen

Painter, Code Generator, L'O Fields, Dynamic Menus, Programming Unit Libraries, Sample Programs, 280 Page Hiustrated Manual 60 Day Satisfaction Guaranteel Brochures & Demo Diskettes avail Highly Favorable Reviews! IBM & Compatibles Nostradamus In

3191 South Valley SI (Suite 252) Sall Lake City, UT 84109 (A01) 487,9665

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

PROGRAMMERS TOOLS

Free SPF/PC™

Interactive demonstration disk, V2.0. Yours for the asking! See, 1900 Mountain Blvd., Oakland, CA 94611 nd Technology Corp Telephone: (415)339-3530 Telex: 509330 COMMAND TECH CIRCLE RES ON READER SERVICE CARE

QuickBASIC Programmers

We have the tools to make your programs faster, smaller and more profe appearance. We also give you important functions missing in OB. We even have a packthat lets you make your OB programs memory-resident in as little as 5% of memory! Call Toll Free or write for detailed information with no strings attached.

1-800-922-3383 • 404-973-9272 MicroHelp, Inc. + 2220 Cartyle Drive # Manerta, GA 30062 CLE 854 OH READER SERVICE CARD

SIMPLE SCREENS

Turbo C users. Forget print! Forget scant! Instead use coo-up windows, easy data entry and validation. WYSWYG screen design and ntenance Functions are so easy to recall you will quickly shelve your manual. Requires IBM PC, XT, AT or true compatible \$50, checks only No royalties.

Dannenburg Software 4362 SE Old Orchard Ct. Milwaukit, 08 97267 503-659-2508

PROGRAM/MANUAL DOC'S ON-LINE DocuMotion, a pop-up documentation utility nives immediate access to source code documentation, manual etc. Build cross-index document libraries from any text file. Powerful print and copy capabilities. Folding document, ten window bookmarks, search, LAN compatible

more. FREE CEMO NWP-Intelligent Solutions, Inc. P.O. Box 20478 Bloomington, MN 55420-0478

(612) 884-5860 TURBO PROFILE: FASTER PRGMS It's easy to spot the winners. They're taster Turbs Profile helps you improve what Turbs office helps you improve your Turbs

Pascal 40 pgms by highlighting bottle necks letting you focus in an speed Turbo Profile counts the execution of each line and gives a complete picture of performance. Writing faster ports has never been easier PROBE SOFTWARE

6204 Ramblewood Trail Suite 1 nissas, VA 22111 703-361-4230/\$39.95 + \$3 SH

WANTED: SOFTWARE AUTHORS Software submissions wanted for IBM-PC and compatibles OS/2 okay Prefer easy to use generic programs. No Games.

OGRAMAT, Inc. Software Submissions P.O Box 1446-SS Orange Park, FI 30073 **Q8TOOLS FOR OulckBASIC 4**

QBTQQLS/21 - an outstanding collection of over 220 rousines for QuickBASIC 4.0 and BASCOM 60. Complete with Birse Ne index

ing, Object Code Screen Designer, Code Formater. Library Manager. Pulldown menus. Scroilboxes, etc. THE most complete package ONLY 969.95 PROJECT X SOFTWARE DEVELOPMENT

222 Church Street Sure 5G Philadelpha, PA 19106-2251 (800) 578-2112 (215) 922-2557

PUBLIC DOMAIN

FREE

Tolt Free - 24 Hrs. 800-245

vithin Californi 1-818-791-9278 CROSE MY ON READER SERVICE CARD.

FREE DISK CATALOGI Large selection of P.O./Shar Business, games, utilities, etc. Over 1500 of the best programs, as described in our free disk catalog! Orders shipped within 24 hrs! \$3.00 per 5.25" disk, and \$4.00 per 3.5" disk.

Each one packed full of useful programs. Call loday MC/VISA GW School

P.O. Box 14008 Artiroton, TX 75094-1008 817-265-2007

PUBLIC DOMAIN

California FREEWARE DOR 2.1 or hid

OKTE VIONE NO 279 OF 27 1 13 475 COMPOSES do - Create. O PRENTIPO VI.S 14664 Principator Plan mg

DEAT Pright Book of BADE.

DEATED A Pricipality mg

DEATED SET Annals guar

DEATE COLUMN SET ANNALS

More driven forms presented TAMES MINISTERS VI. S 1888 Complete project angul sys > 7900 PC-ACRT VB.0 (200) long-paid C-L A-2 d A-7 > BEAL SPIRITS ARADVE Here Gree - CERCEROOS VS.1 ON Christest propus

Mens drives payed system. SERVIL PROPERTY DOES According partiage SALTILES MAR & 4000 IN MICA & program

T16.1 890 - 390; - D doù set D PROCORREYS, 45 89 4 50 C 695 and Moss 600ss

OTHER DESIGNATION &

1-800-262-6053

801-428-5722)

SOFTWARE CAFE

10% West 10th St

Level MS 3940

plates, more

PC PRODUCTS 2216 Hinos. Boss. ID 83706

800/882-6526 rst 956

1-800-262-6053 24 hrs.

IBM P.O.& User Supported software, as low as \$1.25 per diskette - 3.5" diskettes available. If

you are curious or a long time user, call our 24

hour order line and ask for a free catalogue. The

to word processing. Call NOW! (MS

newest and best, all types, from acco

FORTY PROGRAMS FOR \$30.00

Best collection of IBM Public Domain Software

. Business, Accounting, Word Process,

Graphics, Spreadshert, Database, Lotus Terri

a Home Use Budget, Inventory Checkbook, etc.

· Chiefs, with software of boundaries looks

Height instruction manual included All for \$30

+ \$3.50 s/h. Vista MC accupied.

new, edit play è prior. Daniel and the City before Daniel and City before Daniel and City before Daniel and the City before Da - Great game: Ages 5-10 EFE ABC'S (181) - Eur k regised S Mark Wills (1880 - Backer

O BLACKARCE 1921 - Adof blackfock game O AUTOREST V4.01 (5 D MORPOUT WAY close : one progress, band fire before a SEA-OFF C SECURITY VI.00 (a) or security security VI PER PERMIT GEN - 2 DE TETE - 670 ores - 10 DE TETE - 10 DE TETE - 670 ores - 1

A Committee of the Comm

TALE SECTION TO LEG 400 4 DEARCAD SECTION TO THE PROPERTY OF THE SECTION OF THE PROPERTY OF TH CIRCLE MIS ON READER SERVICE CARS

D PC CALC + V I.O (BOT-ON

DIOTES 153 PROGRAMS GA 301 - 15 Chia sett Requires Letter D AS EAST AS VE.O (2001) - Le

DOS SELP dos - Not wines by Dos Fer Dos 3.XX

Monu drives

D 2000007236 (357) - The basks of oning most F D software

D AUTOCCOPU V4.01 (580) - Ac-

Beginning tetar for Lang. 1716-153 PRODUCANTS (SE

GREAT SOFTWARE GREAT PRICES!

-PC and compatible. Fittance, programmino games utilities graphics education and much moral Large 32 pg. cata-loge with full descritions FREE! Prices as low as \$2.00 each! Visa, Mastercards & COD Welcome, Call or

write for a free cataloge! Computer Solutions P O Bea 354 Moone MI 48854

Domain

1-800-874-9378 1-517-628-2943 CITICLE 793 ON READER SERVICE CARD

SW/Public continues . . .

PUBLIC DOMAIN

INCREDIBLE SOFTWARE For IBM/Competible Computers

Get a Word Processor, Spreadsheet, Database, Money Manager, 5 arcade games plus our 10,000 program alog for ONLY \$10.00 (+s/h) VISA, MC, AMEX (COD +1.90)

International Software Library 511-104 Encinities Blvd. Encinities, Ca. 92024 800-992-1992 (National) 800-992-1993 (Ca only)

CIRCLE 711 ON READER SERVICE CA1D

PC MAG SPECIAL FOR IBM SOFTWARE

Receive a Personal Finance Manager, Word Processor, Mailing List Program, 7 Fun Games, Spreadsheet plus our extensive cotolog for ONLY \$8.95 (plus s/h VISA, MC, C.O.D. (+ \$2.00) MICRO STAR

P.O. Box 4078 Leucadia, CA 92024 Call Toll Free

Notional: (800) 443-6103 Colfornia: (800) 443-7430





PUBLIC COMAIN Public Demain and user supported software for IBM and compatibles. · Video Training Tapes Available. . 100's of disk and 1000's programs.

 Low as \$125 per FULL disk · Send \$2 (refundable) for directory disk set. Visa/MC accepted. US/PO LIBRARY P.O. Box 119 Clinton, TN 37716 615-457-3317

FREE Catalog on DISK

The BEST collection of public domain/shareware

software for IBM & compat. HUNDREDS to choose from IDX DCS

P.O. Box 1561 Corona, CA 91718 (714) 734-7075 Call or send for free disk now! Specify size: 5.25 or 3.50

REAL ESTATE

THE COMPLETE REAL ESTATE SERIES Heiging Thousands Make Millions' since 1985. The most complete CPA/Auditor tested and roved series of Real Estate programs available anywhere! The industry leader! The series cludes: Complete Property Manager-II (\$795), Complete Real Estate Investor (\$495), Complete Money Manager (\$195). Complete Credit Checker (\$249), Complete Property Tracker (\$495) & 1031 Decisions (\$995), For demo (\$15) and/or literature call 8016 Plainfield Road Cincinnali CH 45236 800-255-6643 or 513-891-6145

PROPERTY MANAGER For the owner/investor who wants at keep track

(714) 536-0770

of his own properties. Flexible & fast, ? vsidenlial or comm., limit of tifty lenants per 6.5k. A great decision looi. Not copy protected, coox as many disks as you like \$29 for full working demo with quick guide \$79 with complete manual and phone support. CAPTAIN'S CREW Bex 216 Surset Beach, CA 90742

BUILDING SEARCH" Software developed by commercial broker instart access to your own inhouse MLS for all commercial office data in your market. Ability to

query over 128 different variables. Profil presentation quality printouts. Manual and demo software available for \$29.95. Ask about our nationwide user networks 11778 Jollaville Road - Suite 200 Austin TY 70750 (512) 250-0505

REAL ESTATE

Tennant-Trac The Ultimate Property Manager Designed by PC IDEAL and a professional property manager to and ease of use.

Apartments + Office Buildings +
Real Estate investments +

Trac 1 to 20,000 units easily and efficient Trac All ternant data, lesse terms and condition Trac All timencial data, accounts receivable Trac. All there are stat, accounts terrowave possible. Trac. All menthly, yearly financials and generate reports. Your profits can be maximized for only \$150 Call new for more into: 1,000 634-5645 on-Send \$10.00 for Demo Deak (credit forwards non-financial).

or in Systems conting 16% as much 5"

MANAGEMENT & ANALYSIS "Real Property Management" \$395/\$595 for residential & commercial properties and other

biógig Flags deling'i lenants, prints budgets, checks, invoices & 1099S. No retroine of recurring data, " "Real Analyzer" \$195, when deciding buy/self, exchange, or refinance 30 day money back queran REAL-COMP INC PO Box 1210 Cupertino, CA 95015 (406) 996-1160

PROPERTY MANAGEMENT Since 1978 over 6,500 users of our software have found it comprehensive. Sexible and easy

to use We offer systems to manage the following types of properties. COMMERCIAL/RESI DENTAL/CONDOMINUM/HOMEOWNERS ASSOC ANINI-STORAGE FACILITIES For more info, and sample printouts call REALTY AUTOMATION 11365 East Shore Onive Hayden Lake, 10 85835 (208) 772-3259

PROPERTY MANAGEMENT Rental-Ease. New state of the art property my

agement software. Extremely fast and easy to use Everything is included, lerant tracking. repairs and maintenance, income and expense, check writing. No extra modules to buy The ultimate in property management. \$655 complate Free brochure, Demo \$10 STINITEGIC OFFICE SYSTEMS 9129 Mallard Circle Sandy, UT 84093 801-942-6784 VISA/MC/AMEX

PROPERTY MANAGEMENT Comprehensive program for managing resid

and commercial properties. Many management proofs including possible statement, delegant ent, lease expiration and fransaction registr report. Provides check writing, check recordilation, posting of late less, recurring expenses-CAS Injectment Analysis - CUS YMROL SYSTEMS, INC. 930 Laguna Street Santa Barbara, CA 93101 805-966-3666

RELIGION

Search the Scriptures Resident

available at any time, from any

Copies verses directly into your word Searches the Bible quickly for any word or ohrose

\$185. Demo available. Call 1-800-255-8602 (in LA 318-322-0897).

BibleSoft, Inc. 1300 Hudson Lane, Sulte 10, Morroe, LA 71201

CHURCH SOFTWARE

POWERCHURCH PLUSIS POWERCHUMCH PLUS**
plast, frendly, reliable church administra-tion system. Membership, tull fund ac-counting, contributions, payroll, pay-ables, multi-user support, & much more - ALL for \$695 complete! Compare us penture-line signature. leature-for-feature against any over-priced package. We're helping thousands of churches with great software at a great price! FREE phore support, no time limit. No high-pressure sales pitch. To order your FREE full-working DEMD version. all Customer Support.
F1 S O F T W A R E
P.O. BOX 3096 BEVERLY HILLS, CA 90212

(213) 854-9865

COMPUBIBLE

 OUR FAMILY OF PROGRAMS HAVE MORE FEATURES THAN ANY OTHER PROGRAM OR YOUR MONEY BACK! · Find any word or phrase in

 Access the Bible, insert verse and find words or phrases whit using your word processor!
 KJV, ASV, NIV, NKJ, RSV For information on all proc call or wri NASSCO P.O. BOX 65600-222

Lubbock, TX 79464 (806) 866-4223 (800) 262-7726

BIBLESCAN

Search the entire Bible, a book, or chapter for a word or phrase. Display and/or print the retated passages or a set of verses to help propare mons, classes, etc. Scan any topic. Excellent Bible stury arie Did Testament \$39.95 New Testament \$34.95 or Both for \$64.95 Available for PC/XT/AT/PS2 Highlands Computer Services Boute 5. Box 456 Abrigdon, VA 24210 703-628-4299 Mon-Sat 9:00-6:00 EST

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

RELIGION

New dimensions in Bible study.



We're celebrating over 5 years of market leadership! Version 4.0 of THE WORD processor includes the complete text of the KJV or NIV Bible for just \$199.95. Our software searches for any word or text string. You can even create indexes on concepts and build your own library of research material.

Our new INSTANT ACCESS add-on product for just \$49.95 finds any word instantly! And our family of products is still growing with topical cross references and rith topical cross references a resonal commentary to annotate your Bible, and Greek und Hebrew transliterators which include Strong's Concordance.

Bible Research Systems (512) 251-7541 2013 Wells Branch Parkway, #304, Austin, Texas 78728

CENTRA FOR IBM, MSDOS, Macantonh, Some programs also for Apple II, C64, TRS80 # PM

THE ULTIMATE BIBLE STUDY Called "Sophisticated" and "entertaining" by PC Magazine (3/29/88), the Bookmaster Bible

is the new leader in Bible software. Powerful search modes, on-line help, report generator, lootnotes and much more! New manual, hee tutorial & 30-day moneyback guarantee \$189 for 6 disk set, \$7 for demo. Koala-T Software

3255 Wing St. Suite 220 San Diego, CA 92110 (615) 584-4371 for line into

PARISH DATA SYSTEM

Comprehensive census/contribution program Easy to operate, menu driven Farrely, member financial into & reports fully integrated. Selective lists, labels, contribution/fultion statements, personalized letters. User can create own reports, letters. Other church programs available Over 1600 users Free into. Parish Data Systems, Inc. 3031 W. Northern Ave., Suite 121 mix. AZ 85051 (E02) 247-3341

SCRIPTURE SCANNER

BIBLE ON DISKS . Search the Bible in seconds for key words or phrases

 Print any list or portion.
 Write sermons, lessons, etc. from your word processor or ours with access to scripture. Priced from \$179.95 to \$669.95

SALES MARKETING

d-to get the most business out of each Day

a fast access to client information keep your records organized
 make fast phone calls * type letters and proposal

* invoice system, too. * Save Time, Increase Sales * Sales Ally Has It ALL!

215-242-8751 or 8750

Scherrer Resources, Inc. Sales Systems Group 81(0 Chesokee Street Philadelphia, PA 19118

PC Magazine Marketplace market!

the ultimate target

The brand specifiers who read PC Magazine don't have the time to shop around, their only concern is getting what they need as quickly as possible.

They'll DIRECT their attention to PC Magazine Marketplace

For them PC Magazine Marketplace's Direct-Response/Display Ad format represents a fast, easy and cost effective method of product acquisition. They know it will have the products they need and the information they want regarding price, volume discounts, specifications and delivery.

If you think that your business can benefit from the 550,000 brand specifiers who read PC Magazine . . . YOU'RE RIGHT!

So take DIRECT action and call (212) 503-5115

a tool to increase your productivity ⁶ calendar calculator
 Mailing Labels
 Call-Back "Tickler" * Free Phone Support

Sales Ally Has It ALL: Sales Ally is also designed for telemarketing and network applications (Versions also available for: Real Estate, Insurance and Stock Brokerage)

SALES MARKETING

JENT-TRACE

"The Ultimate Competitive Edge" CLIENT-TRACE - A PC IDEAL

the Professional Salesperson a competitive edge while efficiently Mar Clean Base, Increasing Sales, Improving Service, Maintaining Organ CLIENT-TRACE allows you to cavily

- ** TRACE thousands of cleans efficiently

 **TRACE theres by same, area, occupation, user-defined, etc.

 **TRACE all pertissen data for EVERY clean such as last cost
 with, actions, details on closing deals.

 **TRACE all "bot" leads done closing deals.
- * TRACE all "But leads duty

 * malliple screen viewing

 * produces marking lists and reports (with graphics)
- CLIENT-TRACE also includes the ability to easily . .
- * TRACE weekly, monthly, year to date sales records and projectors.

 * TRACE travel and entertainment expenses.

 * TRACE YOUR PERSONAL CALENDER of scheduled appointments.
- CLIENT-TRACE provides all the above in an easy to use, menu driven formal with on-line support designed for the Professional Safesperson. Total utilization the system requires NO PROGRAMMING. Your Sales potential can be realized with CLIENT-TRACE for ONLY \$195
- For More Information Call PC IDEAL Today at 1-800-634-5641. Send Check / Money Order (PA residents add 6% sales tax). PC IDEAL, 650 Sentry Park Way, Suite 1, Blue Bell PA 19422

Lead Management

ONLY \$99.95 to the

Menu Driven - Daily To-Do & Top 10 Lists - Sales Forecasting - Expense Reports - Price Quotes - Complete Documentation - Spreadsheet - Word Processor - Direct Mail - Telemarketing rhouse Systems Inc.

1-800-525-5774 1-919-721-0241 1022 W. First St. Ste 104 Mnaton-Salem,NC 27101

CIRCLE 7M ON READER SERVICE CARD

SECURITY

THE ULTIMATE **COPY PROTECTION**

Quite Simply The fleet Way To Prole Your Valuable Software Immedian Completely Menu Drivan
 Defeats all Hardware/Software

Copiers
No Source Code Changes
Not Source Code Changes
Multiple Layering
No Damaged Media
Full Hard Disk Support
Unlimited Metering
FREE Demo Disk

STOPCOPY" 1325" STOPCOPY PLUS" 1450" HIII COMPUTER SYSTEMS: HIOS Heritage Line Saver Spring, Milyland 20106 (301) 871-1094

CIRCLE 809 ON READER SERVICE CARD

SECURITY

DataCrypt

From the Creators of PROTEXT DataCrypt - D A u

designed to provide BUSINESSES, GOVERN-MENT AGENCIES and INDIVIDUALS with TOP LEVEL SECURITY while retaining, receiving and

transmitting classified information. -Coded data is unbreakable (exceeds Data Encryption Standard) No "back door," Cannot be reverse engineered or "jammed Menu driven and user friendly with on-line tutorial

Encodes all types of files at speeds up to 100K cpm Every system produces unique codes based on unique keys
 Full control over encryption keys provides endless security Authentication, audit trail, verification, scanners and more

u

u

•

DataCrypt, the ultimate security system, can be obtained for \$249 -or- inquire about a site license. For TOP LEVEL security call PC IDEAL today at 1-800-634-5641 Demo Disks \$10.00. (credit toward purchase).

Send check/money order to: PC IDEAL, Inc. Executive Suites 650 Sentry Park, Suite #1, Blue Bell, PA 19422 "Finally, an IDEAL data security solution, DataCrypt."

SECURITY he world's leading soft-

privilege based, system security upling that wents unauthorised access of your PC's sub-spines, files and disk drives. HOS OFF THE PROGRAM (*

hard disk by prevening unsufficied use mostlying the DOS file attributes plead Ovi sen. Systemi. For example, use she REA Y attribute to prevent vivus programs fro

MOS OFF THE PROGRAM restricts acc in hard disk visit bloking." A "locked is may not be toomed accessed by applic hours or formatted via the DOS FORMA and until it is "unlicebed." OS OFF THE PROOF

HANDS OFF THE PROGRAM incorporates and concern advanced socially schindupses on PCTs ranning PC-005 Y03 or higher The BOS PORMAT or Drive C is prevented white the PC is in use, he security manager is prescried against Cortex Break and a boot here flaggly results in the automatic lecting of Over C. DS OFF THE PROGRAM A

d Only and Execute Only privileges by

ma\$89.95 prior SOB. But and 17%-shoping the Common of the Wide More Wide Wide More Wide More Systems Consulting Inc. 412-963-1624
Box 111201, Prindungs, FA 18236-000

wore manufacturars depend on Softguord copy protection systems. Your FREE DISKETTE introduces you to SuperLock " - invisible copy protection for IBM-PC (and compatibles) and Macintosh. Hord disk support

 Na source code chan Customized versions LAN support New upgrades available

(408) 773-9680

SOFTGUARD SYSTEMS INC. 710 Lakeway, Suite 200 annyvale, California 9406 FAX (408) 773-1405

LE 791 ON READER SE

RIT-LOCK® SECURITY

Pracy SURVIVIAL 5 YEARS proves effectiveness of powerful multilayend security Rapid decryption algorithms. Reliable/small port transparent security device. PARALLEL or SERIAL port. Countdown and timeout options also available. KEY-LOK" security at about 19 BIT-LOCK cost. MICROCOMPUTER APPLICATIONS 7805 S. Windermere Circle Littleton CO 80120 (300) 922-5410 or 798-7583

PROTECTION

Az-Tech Software, Inc. 305 East Franklin

ΆŻ Richmond MO 64065

(816) 776-2700 CIRCLE 709 ON READER SERVICE CARD

SW/Security continued

on following

page . . .



SECURITY

With our Copy Protection Products. They really work and do not burden the honest user. . .

For Disk Security

- High Level Security · PADLOCK II DISK SAFEGUARD DISKS
- COLIPON DISKS

For Hard Disk Protection • HDCOPY Low Level Security Her hatelishis Destartors

· PC-PADLOCK The market is filled with copy protection products which burden the user or samply don't work. We have over 2500 satisfied software. firms utilizing our systems. The high-level fingerprist has not re-

an update in over 2 years. Why should your valuable data or uneful software program become



ENGINEERING INC. (312) 364-SOFT Telex 493-7109 CIRCLE 792 ON READER SERVICE CARD

SHAREWARE

SAVE UP TO 74% ON SOFTWARE When you buy software "off the shelf" you pay 50-74% for advertising, packaging and distribution. With Shareware the author lets you try his settware at no risk. If you like it send him a

donation. Send \$1.00 for catalogue of over 800 Shareware programs. \$2.95 per disk (Carracta \$3.95), 3.5" formal available in Canada Write: 269-C Springside Orive, Hamilton, Ontario ALTERNATIVE PERSONAL SOFTWARE

P.O. Box 1370 Lewiston, NY 14092

SHAREWARE

SAVE 90% ON SOFTWARE! Stareware programs compare favorably to commercial programs cooling \$200 and up! E2 Forms, Homebase, PC Key Draw, PC Outline, over 170 others to choose from, all for \$6.95 or less per disk! Money-back quarantee IBM, PC, XT, AT. it, or compatibles. Call or send for FREE catalog SHAREWARE EXPRESS

32302 Camino Cagistrano, Suite 204W P 0 Box 2'8 San Juan Capielrano, CA 92693-02/9 (714) 243-1322

UNIQUE SOFTWARE APPLICATIONS We offer only quality software specially selected for home, personal and business use. We also leature Games, Entertainment, Education, Finance Wordsrocessing, Unities and more Just \$4 per disk Money Back Guarantee, Write for our FREE detailed catalogue PC Arrade

STATISTICS

276-P Morehouse Rd

Easton, CT 06612

MINITAB'S a PC of cake! MINITAB features intuitive commands for comprehensive data analysis. Includes basic statistics •

regression • time series • tabulation ANONA • plots • histograms • much more, DOS based version in-cludes LOTUS interface, hi-res prophics, no copy protection. Used in

over 60% of Fortune 50 comparies. For free brockure call 814/238-3280. **MINITAB**

3081 Extensive Dr. State College, PA 168 CIRCLE 771 ON READER SERVICE CARO

Pick & Choose for Your PC BMOP Statistical Software offers 40 program for data analysis. But you can choose any combination to suit your needs. From simple statistics and plots, to T-lests, ANDVA, AN-COVA, slepwise regression little series, Iroquency tables, survival analysis and more! Call for your free catalog. Hard disk regid

STATISTICAL SOFTWARE

BMOP Statistical Software, Inc. 1440 Sepulveda Bivd Los Angeles, CA 90025 (213) 479-7799

STATISTICS

nance STATISTICAL SYSTEM



A powerful, elegant, and super-fast statistical package integrated with complete data management and dynamic graphs. Comprehensive selection of descriptive, inferential, and exploratory statistics with forecasting statistics with forecasting statistics with forecasting statistics with proceedings of the statistics of the programment of the statistics with forecasting statistics of the st

A StatSoft

2325 E. 13th St., Tulsa, OK 74104 (918) 583-4149

rg FRG) ph 040/4200347 StatSett UK (Lon-i Melbourite Australia) ph 613-497-4276 spek SERVICE CARD

RATS!! Best-selling and most compre-

hensive econometrics & forecasting software available. Combines regression, time series and forecasting with data base management and high res graphics. All for only \$300. Call today and find out how RATS can belp you!!

1-800-822-8038 VAR Econometrics P.O. Box 1818 Evanson, IL 60204 (312) 864-8772

CHICLE 762 ON READER SERVICE CARD

STAT PLAN III assest to use statistics program available. Complete range of statistics-curve fitting crosstabs, correlation, multiple regression. Lieurs etc Grantics with printeriplotter gulput Capable of handing over 50,000 data

points, interfaced directly with lotus files. Demo acte acitable MCVISA Only \$179 THE FUTURES GROUP-STAT PLAN III 76 Eastern Blvd., Dept. C Rissignibury, CT 06033-1264 (203) 633-3501

BASEBALL * * BOWLING BASEBALL LEAGUE STATS - maintains a full set of batting, fielding and pitching statistics and complete game by game histories. BOML-ING LEAGUE SECRETARY - memians and updates all recessary records for learns and individuals in small or large leagues. Baseball -

\$39.95 Bowling - \$44.95 Visa/MC Mighty Byte Computer, Inc. 6040 A Stx Forks Rd . Suite 223F Raleigh, North Carolina 27609 1,300,237,7072

BELIEVE IT!

StatPac Gold™ with the Forecast Plus™ Option is the Most Powerful Statistical Analysis and Forecasting Package Available for the Microcomputer

FREE Comprehensive Brochure: 1-800-328-4907

WALONICK ASSOCIATES, INC (612) 866-9022 CWICLE 848 ON READER SERVICE CARD

THE BASS SYSTEM BASSBase + BASSSlat + BASSView = Power! For data management/analysis/report generation. The SYSTEM: 384K and 2-31/7" drives or onehard disk. \$229 thru 8/31/68 microBASS, 256K and 2 flaggers \$95 Call or write for information. BASS Institute Inc.

P.O. Rox 349 Chapel Hill, NC 27514 (919) 489-9729 or 88. (919) 489-9665 (N.R.1)

STATISTIX - ONLY \$1691 STATISTIX is a powerful and very easy-to-use

statistical system for PC's. Used by many universities, businesses, fed, and state covernments and research organizations. Check us out before you buy a statistics program, you'll agree SX is a "besl buy" SATISFACTION GUARANTEEO. For more into NH ANALYTICAL SOFTWARE PO BOX 13204 Roseville, MN 55113 (612) 631-2852

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .

STATISTICS

NCSS plus-\$99

Easy-to-use menus & spread sheet Multiple regression. T-lesis. ANOVA (up to 10 factors, rep. sures, coveriance), Forecasting, Factor, cluster. & discriminant analysis. Nongarametrics. Cross Tabulation Plots histograms, box, scatter, stemiest. Sort. Subset. Transformations. Reads ASCII New graphics Pkg \$59

MS Fast 400 North Kaysville LIT RAD37 Phone 801-546-0445

SIGSTAT IGSTAT includes over 70 programs of the BMD statistical series, plus many advanced new leatures. Mainframe capacity (up to 80 var.) for uni-(e.g., ANDVA, regression) + multivenate (e.g., canonical, factor.) analyses, irrneseries, mullidim scaling, crosstab, plots, q/c and more 8087 support opt 256K, DOS, \$595 SIGNIFICANT STATISTICS 3336 N. Canyon Boad Provo LIT 84604

(900) 377,4950 SURVEYS

SURVEY MATE

The integrated survey package last & accurate data entry with automatic values, range, logic checks, age calc, verification, verbalim entry/ report for open-ends. Frequencies, Recoding Crosstates, Regression, ASCII file export, up to 1000 fields. Users in 41 countries, \$145, 60 day Money-back Guarantee

Henry Elvins & Associates Inc. 15 Willow Circle Bronsville, NY 10706 914-961-7375 Orders: 800-622-4070.

933 GH2 7217 THE SURVEY SYSTEM An easy to use menu driven system for the

only, ediling, processing and presentation of questionnaire data. The system can produce carriera ready crosstabs and other tables in banner lormal. Also statistics and bar charts Regression and open end coding/analysis oplions available CREATIVE RESEARCH SYSTEMS 15 Lone Oak Cir., Dept. P. Petaluma, CA 94952

707) 765-1000 UTILITIES

TERMINAL. EMULATION

BARR High-Performance **RJE Workstations**

BARR/SNA RJE and BARR/ HASP are communications hardware/software packages for the IBM PC and PS/2 series of computers.

Full featured: multiple printers · unattended operation, print speed beyond 6,000 lpm.

· special forms. · line speed to 56,000 bps. dial-up or dedicated lines, and serve as a LAN gateway.

BARR/SNA RJE emulates IBM 3777-3 in an SNA environment BARR/HASP emulates IBM 77-2 and HASP on the 360/20. BARR communications software is also available with PC-SYNC internal modems: 208AB, 201C, 9600.

2830 NW 41 St. Bide M 800-BARRSYS or 904-371-3050 CROS & 705 ON READER SERVICE CARE

UTILITIES

HERCULES OWNERS

Athena BIOS™ This unique software and hardware

tion allows up to 95% of existing CGA software to run without modifi-cation on Hercules adapters. Outperforms all others (see PC Magazine, Nov 24, 1987 pp 28 and 48). Runs on PC, XT, AT, L.E. and compatibles

all Hercules adapters. Softwa with emulation adapter - \$60 ATHENA DIGITAL

2351 College Station Rd. Suite 567 / Athens, GA 30003, Phone 404/354-4522, ORICLE 754 ON NEADER SERVICE CARD

Fix common problems fast! You don't need to be an expert to diagnose and correct problems in

volving PC setup. All you need is HELPME™ software! More than 300 tests. Quick identification of system configuration and com-patibility. \$99 + S/H. MC/VISA. California Software Products, Inc. 525 N. Cabrillo Park Drive, Santa Ana, CA 92701, (714) 973-0440. CIRCLE KIN ON READER SERVICE CARE

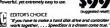
UTILITIES

SpeedStor Hard Disk

Integration and

Partitioning Software For PC ATs, XTs and compatibles.

- Integrates virtually all 5% Inch drives.
- Supports ST412, RLL, ESDI and SCSI controllers.
 Flexible partitioning, with volumes of any size. Spans multiple drives into a single volume.
- Includes trouble-shooting diagnostics. Powerful, yet extremely easy to use.



simple and painless . . . Its user interface is a joy to work with." "SpeedStor software makes Installation

Used by major disk drive and PC manufacturers, 250,000+ units sold. Now available through Softsel dealers.

STORAGE DIMENSIONS

981 Linbersity Ave. Los Gatos: CA 95030 (408) 395-2685 CROLE 797 ON READER SERVICE CARD

RUN NOVELL WITHOUT KEYCARD Protect Novell Network from crashing due to Keycard Failure

Break the 12MHZ server barrier Free-up slot in server

NetSAFE for v2.X \$99 US Other products available for:

P-CAD CADKey CADam CADvance Personal Designer VISA or American Express



Include \$10 shapping. Our products should not and are not intended for 2704-85 Garry Street production of software for sale or trade or for Winnipeg, MB any purpose that would Canada R3C 435 (204) 956-2798

CROLE 716 ON READER SERVICE CARD

UTILITIES



r more of your scheduled backup. I se, to check backup status and run ave press F1, to abort press EN Why Pay More? Now Only: \$49.95

QUIKSAVE REMINDS YOU TO BACK UP YOUR HARD DISK... cally Backs Up For Youl

The hit of the year is Quikasve. It will remind you when to backup daily, weatly or at any specified interest. Our unique warning system talls you the number of days since the last backup, which files days since the lest backup, which files have changed and a setular spect for all exhected backups. Belos up 25 mag in 8 minutes on either 5.25° or 1.00° files. Once you have seen Cultisare in operation, you will see why numerous FORTLINE TOOL companies such as NASHSCO, COMPUSERVE, and CITISANK and others beckup daily using Out And It's PS/2 COMPATIBLE! Call

1-800-888-8086



Batcom — Batch file compiler compiles your "bat" files to

".exe" files to make them faster,

REDCache — speeds hard disks by up to 7 times and floppy disks

by up to 55 times. LIM EMS sup-

Spool - allows you to us

your computer while your printer

prints long documents. LIM EMS supported, \$39.95.

RED Utilities - Contains the

three programs above plus pro-

tection from accidental hard disk

formatting, sorted directories,

text searching, DOS wild card ex-

ceptions, and much more. \$79.95.

/ → \ Wenham Software Co.

5 Burley St. Wenham, Ma. 01984

An effective DOS alternative with all the com-

mands necessary for complete distritle mainte-

nance Easily installed tailored to exclude un-

wanted commands. DisplayWhite users will appreciate LOCATE & VIEW for maintain

ON READER SERVICE CARD

Visa, MasterCard accepted.

(508)-774-7036

FILE-MANAGER 2000

WJ Osberg Services

3 Goll Center, Suite 159 PO Box 681489

Schaumburg, IL 60168

able. \$49.95.

orted. \$39.95.

ore professional, and more ca-

Ammunition to conquer your biggest problems!

255 • **599**

CIRCLE 803 ON READER SERVICE CARD

Michael V EMI

 The Virtual Expanded Memory Manager provides your EMS applications with up to eight registyses of expanded memory a training PG/AT or PS/2 on tended memory into expanded memory. ens hard disk storage into expanded memory

It's compatible with most EMS applications, including 1-2-3.

Only \$80.95 30-day money-back guarantee Fort's Software P O Box 396 Manherton KS 66502 (913) 537 2897 V-EMM CLE 796 OH RE



IBM PCs. XTs, and compatibles with no hardware or software modifications. A 360K floppy drive is not required CPYAT2PC may reside on your IBM AT hard disk and copies 1 file or entire subdirectories in 1 step Price \$79 i

MICROBRIDGE COMPUTERS INTERNATIONAL INC. 655 Sky Way - Suite 125 San Carlos, CA 94070 1-800-523-8777 (CA) 415-593-8777 (NY) 212-334-1858 CIRCLE SO! ON READER SERVICE CARD

EBCDIC documents Only \$69.95 + \$5.00 sh (312) 303-5341 ... CNAMD/COD, VISA/MC a distribut shiretibi. a SAVE TIME WITH VTDOLS!

Fast, easy to use tookit full of timesa programs improves your mond and efficiency Programs to find files, display/sort directories, viewimodity files in ASCII or hex formal, refocale files, compare/update files, even a piobal "CO" command, plus much more! OS/2 compatible! Call toll Ired \$49.95 + \$3 s/h CA Tax. See our ad page 4



GOLDEN BOW SYSTEMS 2870 Fitth Avenue, Suite 201 San Dego, CA 92103 800-784-3269 BREAK 840KI

Why buy expensive boards? VRVM" gives your PC/XT/AT or PS/2 8 megabytes of memory by turning disk space into expanded memory!

Use extended memory for expanded memory Casale VERY LARGE worksheets FAST 6409 not required. Use with 1-2-3, Symphony, and other EMS programs, \$49 + \$3 s/h. **BIOLOGIC COMPANY** 11982 Coverstone Hill Circle, Sie 1622

Manassas, VA 22110 (703) 368-2949 CNI-COD

IBM Uses CP/M & Apple "The best", "strongly recommended" -PC mag Linform copies files, reads & writes directly in 700 CPNM disk formats on the PC.XT.AT-by Micro Solutions \$82 95 + \$3 S/H

· MatchPoint 1/2 card transfers Apple DOS SOS, CP/M and ProDOS files to IBM PC.XT AT-\$185 + \$3 S/H (includes FREE Uniform). Rive Herre 1106 S. Second St. Dekalb, Illinois 60115

(815)758-2355

Back-of, Backs up 10 MB in 4 min. Backs up to A recipier form

restores from any DOS device Formats. illes and backs up to floopies in one step \$55 & \$4 sh Q-DOS II simplifies DOS com-mands with blazingly test speed \$39 & \$4 sh Easy to learn & use Demo \$3 Check, MC CARTER MARKETING

P.O. Box 672 Coersegold, CA 93614 (209) 656-7532 RECORD/PLAYBACK KEYSTROKES

TOTAL RECALL captures keystrokes while you use your programs. Play back your keystrokes and it runs your programs for you TYPING EVERYTHING YOU DIO Save time! Less typing! For luterials, audit trails, demos, QA tests, prot solvins, recovery Proug/talch, edit, 4 spends more! \$79 30 Day guar Dealers too! Computer Foundations 2604 Elmwood Avenue, Suite 320 Rochester, NY 14618 (716) 586-9756

No.1 backup software, 10 Megs onto 2 floopies in 4 min! Compresses files. Copies to any DOS device finc tace). All other last backup programs bypass DOS and are unveloble and don't work witnessy clones. Please compare. Nothing else even comes close. Money back guarantee \$89 + \$3sh. BIOLOGIC COMPANY

11962 Coverstone Hill Circle, Suite 1622 Marassas VII 2210 (203) 368-2949 Check(CDD

RECALC 1-2-3 5X FASTER! 3-2-1 Blastoff compiles 1-2-3 formulas into code for 8067 meth chip which loads with your worksheet into 1-2-3 Recalc 3 to 15 times faster and protect proprietary formulas. Use all 1-2-3 features, any size worksheet. "Hot Prospect" -PC Magazine \$124.95 with 30-day moneyback guarantee

FRONTLINE SYSTEMS. INC P.O. Box 7408-PC San Francisco, CA 94120-7406 800-451-0303 Ext 55, 916-677-7171

LIMSIM Expanded Memory Simulator for the 286 & 386 machines. Use the extended memory you already have as Lotus style Expended Memory PC Magazine (March 31, 1967) says "Easy to use and well documented" \$70 (\$100 with assembler source), 30 day money back quarantre Visa/MC accepted

Larson Computing 1556 Halford Ave #142 Santa Clara, CA 95051 (406) 737-0627

Opt-Tech Sort/Merge 3.0 Upin-tech Soft/Merge program. Run as a DOS Extremely but Soft/Merge program. Run as a DOS command or CALL as a subtroutine. Unlimited flesions, most languages, datatypes & fletypes supported including Brieve and GBASE II & III. Advanced leatures include record selection, record reformations & much more! Call or write for

more into MS-DOS \$149 Zenix \$249 Ont-Tech Data Processing P.O. Box 678 Zephyr Cove, NV 89445

(702) 588-3737

SEE CURRENT FILE ACTIVITY

WATCH-I-D Poo-up utility that displays files poer. DS DX of open and last read/write. R/W counts, lest ourc. lest open, lest file-not-found. User can select hot-key, pop-up for file opens, pop-up for file-not-found, track file opens on printer MC/Visa \$49.95 w/antivitus cpt. 199.95

Ouertum Publish 23860 Miles Road Cleveland, OH 44128 1-800-342-6237

1957/859/000

LITIL ITIES

RUN YOUR PC AUTOMATICALLY! Specify what le run and when le run it and let Auto-Might do the rest. Run backups, communication, diagnostics or virtually any pro-gram utility - unattended. Run software daily, weekly, monthly or years in advance DOS 2.10 and up. IBM and compatibles \$49.95 + \$4.00 s&h (Colo, add 7.1% tax) The Pendulum Group, Inc. 333 W Hampden Ave Suite 1015 ood, Colorado 80110 (303) 781-0575

WORD PROCESSING

Word Perfect Add-On ONLY 585 Turn WordPerfect into a Scientific Word Processor

 Supports WordPerfect 4.2 or 5.0.
 Display and print complete Greek and much symbol sers. Custom profer deliverons and macros included free of charge for WordParlect owners.

Includes custom display chig or index card described program

Tool deveload program for did matrix printer.
Need Large or 10 years scientific character set available for HP LaserJet." Large 150; Write or call for their connected hardware, and

TOTAL Section of the SWPE Suker, B. 60077-2042 U.S.A. CIRCLE SHI ON READER SERVICE CARD

WRITER'S SIDEKICK SERIES

The goof-proofer Avoid those embarassing errors in your writing. Lay vs. lie, farther vs. further, affect vs. effect. Most of us make the same mistakes over and over, and who has the ome to refer to textbooks. Let the SIDEKICK SERIES do it for you. Order SK Series #3 \$29 complete Demos not available CAPTAIN'S CREW

Box 216 Sunset Beach, CA 90740 (714) 536-0770

World's Billingual Word DuengJan, bilingual word processor for En-

glish and: Armenian, Bengali, Euro/Lalin, Greek, Hindi, Khmer, Lao, Puniabi, Russian, Sinhales Tamil, Thai, Viet \$109 + \$5 sh Nominn + \$12 s/h) Font editor included For IBM comparible with dot-matrix & LaserJet printer Deene \$6 + \$1 s/h MesaChomp Company 3524 Cottman Avenue Philadelphia, PA 19149-1606 USA

WORD PROCESSING

CompareRiteTM

"Outstanding software - the best of its kind... CompareRite compares documents in ways that I didn't think were possible. It's saterly amazing."

— John Dworak, PC Magazine, 3/15/88

sareRite saves hours of editing by showing you how any two documents differ. A mazingly fast, CompareRite will create a complete comparison draft, ready for printing, or display the changes on the screen so you can scan them. The program shows changes in many user-selectable formats, and is compatible with all major word processing programs. CompareRite is perfect for attorneys, editors, proofreaders

or anyone who has to make or compare drafts. Thousands in use Price - \$129.95 + \$5 shipping/handling JURISOFT

763 Massachusetts Avenue

Cambridge, MA 02139 (Outside MA) 800-262-5656 Ext. 10 (In MA) 617-864-6151 Ext. 10

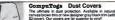
عربي ،Έλλημκά, برجاب Pycoxisti, Farsi, English, Europ & Scandinavian; plus either IPA, Hindi, Bengali, Gurmukhi, Tamil, Thai, Korean, or Viet Full-featured word processor supports on screen foreign characters and highest

quality printing with no hardware modifications Includes Font Edisor \$355 incl. US shipping \$150 addl for later \$19 demo Ren 6400 graphics Money back guarantee Gamma Productions, Inc., 710 Wilshire Blvd., Sta 609, Santa Monica, CA 90401 (213) 394-8622. MC/VISA/AMEX. CINCLE SAA ON READER SERVICE CARD

PC-Write SHAREWARE VER. 2.71 Fast powerful word processor/but editor to BMXTATPX Switch checker screen clin mailmerge, split screen ASCII tiles, macros Supports 4000 printers, incl. Laseriet + and Past Script, \$16 for softwere, tutorial & quide on disk. \$89 to register for manual, support newsletter. & updates, 90-day Guarantee DUIDSSOFT, INC 219 First North, #224 PMAC Scottle MIL 08170

1-800-888-8088 (206) 282-0452 Visa/MC

MISCELLANEOUS/ACCESSORIES



COMPARE OUR PRICES! RETOURS 13.55 PRINTER (panel); 15.55 COMPARE OUR PRICES! RETOURS 13.55 MONCRY 24.55 COMPATOR PO D. Don 659, Chester, NJ 07330 - (201) EFF 52.46 VISANC Accepted Include 250 Shooping CUSTOM EMPRODERY SHOWN JUNE 491, CHICLE 691 ON REACHER SHOWN CAME CAME 1.50 Shooping

PRINTER RIBBONS C ITEH Prowrit

\$4.95 EPSON MX/FX/RX80 \$5.00 EPSON MX/FX/RX100 \$6.50 OKIDATA 92/93 OKI DATA 182/192/193 + \$5.00 Call for complete list of products & into Dealer posities selcomed DATEC DISTRIBUTION PO Box 411 Freemont, CA 94517 ars. 790-6393

TO PLACE YOUR AD IN PC Magazine

> Marketplace Call (212) 503-5115

ACCESSORIES CompuCover@

ORDERS W.

KeySkin" Keyboard Covers Clear to the sue. Soft to the touch KeySkin" Covers etey on while you use your computer. Heny different models to chose from. Cell toll free USA (800) 874-6391 FLA (800) 342-9008

CompuCovere 2104 Lewis Turner Blvd (Dept. P1) Ft Wolton Bch , Ft 32548 CIRCLE 850 ON READER SERVICE CARD



• 100% Catton Canvas • Breathable! · Beige w/Goty Trim • Static-Free For: Computers and Printers IBM, Epson, AT&T, Leading Edge, Compaq (800) 826-5761 In CA (415) 759-1466

Contemporary ComputerWear 1320-36th Avenue San Francisco, CA 94122 CIRCLE IOS ON READER SERVICE CARD

BAR CODING



PERCON E-Z-READER

FAST * ACCURATE * RUGGED D SOFTWARE CHANGES wen PC

Details or Questions? Call us. (503) 344-1189

PC MAGAZINE . AUGUST 1988

BAR CODING



(Epson/IBM/Okldata and LaserJet) · Flexible format · Any size label · Auto-Incrementing

Reversals

- · Labels for bins, shelves. inventory - name tags
- Color Options · Big text readable up to 50 ft. Laser Soft Fonts Bar Codes: 2 of 5, UPC/EAN, • File Input
- MIL-STD, AIAG, Code 39, etc. Very fast Easy Label above printed with \$279 program. Other ber code programs from \$49.

BAR CODE READERS



V.VORTHINGTON DATA SOLUTIONS 417-A Ingalis Street Santa Cruz, CA 95060

In CA 408-458-9938 408/458-9938

30 Day Money Back

BARCODES & CHARACTERS Software for PC, XT, AT & comp. Log AIAG, Code 39, etc. for HP Laseryet, Epson, Okidata & printers w/IBM Graph \$275 Bar-

code Inventory and comm progs \$49 Keyboard batch file and serial nort input acid Automatic Barcodes from elec. Scales and Cash Registers, Small Confless portable & Bar Code reader 1" dia x 7" Free into. Guarantee C.F. Electronics 3985 Rochester Road, Suite H

Rochester MI 48063 (313) 656-0630

BAR CODE-LABEL PRINTING THE LABEL MAKER " prints bar codes OCR-A like and large characters from data entered at

keyboard or from disk Mes. Create and save unique printion formats and month lavours. Performs record add, change, delete, sort and select on disk files A.I. LABELMAKER" prives AIAG shipping-parts identification labels required by Auto Mitrs. Requires IBM PC or work-alife. TJ SOFTWARE INC P.O. Box 2044

Arlington Heights, IL 60006 (312) 364-1065

red bar codes directly from your own MS-DOS applications without copying data to special print Ites Supports Epson, IBM Graphics, and H-P

ANNOUNCING VER 6 NEW FEATURES have been added to our popula Now print EAN 6 and EAN 13 in addition to UPC UPC-E, Code 38 and 2 of 5. \$265 High density dot-matrix bar codes supported. Developer inquiries invited

CodeScan 2000 Bar Code Reader CALL FOR FREE BROCHURE (\$15) 522-4640 Bear Rock

CIRCLE MA ON DEADER REPORT CARE

EZBarcode™IIII III III II BAR CODE READERS

Bar Code Reader 44 PC WEDGE Reader . No software changes necessary
 For PCXTIAT or compatible
 Reads Code 39, 2 of 5, UPC, Codab
 EZBarcode I prenting software inclu EZBarcode I Printing Program

For dex matrix and Laserlet printer Vary bar code height, spacing, etc. ZBarcode II Printing Program . . . \$99.6 Keyboard or test file data input Prans Code 39, lean(seved 2 of 5, UPC-A ard or test file data imput Code 39, brandeaved 2 of 5, UPC-A atic incrementing, multiple columns

TimeKeeping Systems, Inc. 12434 A Coder Road • Cleveland, OH 44108 (216) 229-2579 • Fax: (216) 229-2573

NO SOFTWARE CHANGES REQUIRED

IBM PC/X1/AT PS/2 CLONES
 TANDY 10005X/1200/3000/4000
 ZENTH 138/148/151/158/248
 EPSON EQUITY I 8 III

TERMINALS:

 CONTROL DAT
 TANDY 0T100
 RS-232 DATA VIKING 721

PC MS DOS BAR CODE PRINTING SOFTWARE

RESELLER DISCOUNTS AVAILABLE **AMERICAN MICROSYSTEMS** 110 S ARPORT CHOLE, SUITE 14 EULESS, TX 78040 (817) 571 9015 (800) 646-4462

BAR CODE BARGAINS NEW TWEDGEN BAR CODE READER

ITS 5306 - PC WAND Bar Code R

BAR CODE & MAGNETIC STRIPE READERS for the IBM PC & PS/2 Simple & quick installation No additional software or port Metal wand & case

Also evallable: Bar code printing software Magnetic stripe encoders Units for other computers 8, ten

TPS ELECTRONICS 4047 Transport Stree Palo Alto, CA 94303 Telephone: 415-856-8833 FAX: 415-856-3843 CINCLE 811 ON READER BERRYCE CA

TO PLACE YOUR AD IN PC Magazine Marketplace Call (212) 503-5115

PC MAGAZINE . AUGUST 1988

BOOKS CATALOGUES PUBLICATIONS

PCir Expansion Products

Possibly the largest selection of PCjr products in the country We don't just sell PCjr products, we design them

*Secol Up Products Althorate DMA Complete Second Flaggs Disk Drives 12 Disk Drives *PC# Oroxal Mice *Montor Adapters for PC's

Parallel Prener Ports *Full Sate Keabs *Speech Attachment Mossacks, Cables, & Adapters Call or write to receive our free 32-page catalog of PCir Add-On

products. For even faster results, circle our reader service number PC Enterprises "The jrProducts Group"

Box 252, Relmay, NJ 07719 (201) 280-0025 (800) 922-PC-IR CIRCLE 812 ON READER SERVICE CARD ****** PCir LOVERS1 *******

A 32 page monthly mins-magazine just for your Each issue is devoted to "How to's" for increasing Por compatibility, D&A, PCsr hardware and software reviews, and much more. Call or write today for a FREE SAMPLE \$19.97/yr for 12 exciting issues (Canada \$25.97 (U.S. money

The Junior Report PO Box 59067, Dept P Schaumburg, IL, 60159-0067

COMPUTER INSURANCE



COMPUTER INSURANCE



SAFEWARE INSURES YOUR COMPUTERS Full replacement of hardware, med software. As low as

\$39 yearly. Covers fire theft power surges, other accidents. Blanket coverage: no list of equipment needed Call for information or de coverage 1-800-848-3469

Local (614) 262-0559 SAFEWARE. The Insurance Agency Inc. 2929 N High Street, P.O. Box 02211 Columbus, DH 43202 CIRCLE 813 ON READER SERVICE CAR

DATA CONVERSION

DATA

DISK - DISK - TAPE - DISK OPTICAL SCANNING WORD PROCESSORS SPREADSHEETS DATA BASES, MAIL LISTS

OVER 1.500 FORMATS IBM PS 2 WORDPERFECT LOTUS LANIER

(212) 463-7511 NATIONAL DATA CONVERSION INSTITUTE

FIRST IN DATA CONVERSION

DISK/TAPE/OPTICAL SCANNING · 33¢ per page hopewriften leid in disk in ASCIII WP formats available on request. Scan Typeset text 6 to 24pt low rat . Disk convert from IBM, WANG, XERCIX, MAC-INTOSH + 1000 other formats (bi-directional) Tape conversions (800, 1600, 3200, 6250 BPI) Quick turneround—Quality Guraranteed 1st RUN COMPUTER SERVICES 1261 Broadway Suite 508 New York NY, 1000s (212) 779,0800

DATA CONVERSION

TURN APPLES TO VITHOL GOING BANANAS!



LABORATORY America's Largest Data Conversion and Optical Scanning Facility

3 Horace Hard Esp., Fresh Meadows, NY 17365 **三 (718) 357-8700 ---**

DISK

DISK CONVERSION

TAPE-TO-FLOPPY FLOPPY TO TAPE TAPE DUPLICATION FLOPPY TO MICROFICHE LASER PRINTING

> 1-800-422-9622 Illn OK: 918 254 96221



CHANGING WORD PROCESSORS? Media transfer to or from IBM, XEROX, DEC, WANG

LANIER, CPT, CT, MICOM, NBI WORDSTAR, WORDPERFECT, MS/WRO, OW3, MULTIMATE, SAMNA, MASIL OCA ******FREE TEST CONVERSION***** Conversion Specialists

531 Main St., Surle 835 El Segundo, CA 92045 (213) 545-6551 • (213) 322-6319

CONVERSION

Computer Compatibility, All It Takes Is The Missing Link,"

a data with this innovative disk-to-disk conversion Make all data compatible data with this in-awatem. It's duck. Easy And, economical

Over 14,000 daik to daik conversion programs available
 Access 8°, 5° « and 3° « formats
 Fast – converts a daik in less than 15 minutes
 Works with any IBMXT, AT, or compatible PC
 Systems start as low as \$6,000

Call 1-800-248-DESK for a Free Demonstrati 317-842-2077 Indianapoles, Indiana, U.S.A.





NCOMPATIBLE COMPUTERS isk leterchange Service Company special as in transferring bias between 1000+ DETIMACE TAPE TO DESERTE
 DEDICATED WORD PROCESS
 15' E25' & 8' FORMACE

ADDRESS

Expert Technical Assistance

amming Data Reformations Disk Interchange Service Co. (DISC) 2 Park Drive, Westlern MA GUES CIPOLE DIS ON READER SERVICE CARD

CIRCLE 917 ON READER SERVICE CAR



CALL THE INDUSTRY LEADERS PIVAR

COMPUTER SERVICES, Inc. (312) 459-6010 165 Arlington Heights Rd #M Buffalo Grove, IL 60089 CINCLE ITS ON READER SERVICE CARD

DISKETTE COPY SERVICE

SOFTWARE

DUPLICATION Custom Packaging Copy Protection Technical Support Drop Shipping
 Fast Turn-Around Competitive Pricing

ATISFACTION GUARANTEES 800-222-0490 NJ 201-462-7628

Freehold, NJ 07728 **DUPLICATION FROM 59¢**

ordable rates only 59¢ for 5 25" & \$1.59 for 3.50° MS/DOS Duplication Price includes. Quality Brown Disc Media "Duplication with 100% verification "Label Application Quick Turnaround & Guaranteed Products

Rates go even lower as you continue to order! DIVERSIFIED SYSTEMS GROUP, INC. PQ Box 1114 aguah, WA 98027 800/255-3142 206/392-0900

MAILING LISTS

FREE CATALOG Over 2 million names on 75 owner/user lists IBM, Apple, mini sites, resellers, stores, VAR's, chairs, mail order dealers, educational, Unix, Pascal, Cobol, Lotus, dBase, modern, investor, publications, clubs. Call/Write for free catalog Note We do not sell hardware or software TARGETED MARKETING INC. - Inv Brechner Bax 5125-F Ridgewood, NJ 07451

TO PLACE YOUR

In N.J. 201-445-7196

AD IN PC Magazine Marketplace

Call (212) 503-5115

NETWORKING

KEYCARD ELIMINATOR-

2.0a & 2.1 KEYCARD FAILURET NEED TRUE SFT?

SLOTEQUND? FAST CPU? 200

SUPPLIES

(712) 707-4086 (713) TSD-445

RIBBONS 1-800-331-6841

1-513-252-1247 (Ohio) Over 350 types

Volume Discounts Available * * Satisfaction Guaranteed * *
RLACK COLORS M F IMACEWRITER

IPPLE 4-COLOR EPSON LX-80/90 EPSON MX-FX 80 295 365 495 PROPRINTER NEC P1. 2.6 NEC P1. 7 640 125 450 OKIDATA 82-92 OKIDATA 182-192 575 MASONIC KYP 5.29

DAYTON COMPUTER SUPPLY 1220 Wayne Avenue, Dayton, Ohio 45410 TERMS MC VISA COD

CRECLE ROS ON READER SERVICE CARD



SUPPLIES

SOFTWARE PACKAGING **To Meet Your Needs**



Gilenco Development Systems offers several choices to help you with your software packaging. Our product line includes cloth and vinyl binders/portfolios for your users manual and program disketts. The binders can be screened with your company logo to add that extra personal touch. The final product is an organized, eye-catching presentation that your efforts deserve. In addition to packaging, Glento Development Systems offers a wide variety of services, including finished product assembly, to help get your software products to market. Typesetting of manuals can be as easy as sending an ASCII file. Duplication and label affixing as well as product assembly/shrink wrap are readily avail-

able. Please consult us with your specific needs. 721 West Algonquin Rd. Arlington Hts., il 60005 (312) 364-SOFT Telex 493-7109, FAX 364-7698

LASER CARTRIDGE RECHARGE Cut your cost in half with recharged

Laser printer curtridges Exclusive toner with blackest print and top quality. Cartridges last 20% long Money back guerantee 27 different Laser Prints engines to rechar

Send empty cartridge with \$40 + \$3 s.h. Monthly discounts. Toner available. LASER SYSTEMS 23 NO. MAIN / P.O. BOX 46 KAYSVILLE, UT. 84037

NER CARTRIDGES SIG

PC Magazine Marketplace

the ultimate target market! The interference and PC Manager dot's have the time to shot ground they sub-convert in prints They'll MISST they allowing to PC Register Marketyl

So take DIRECT action and rail (212) 503-5115



SUPPLIES



300cs FOR Grand Rapids Mr ALL FOR FREE CATALOG and 4% sales by COO read

OC) cosh, cort chia, Mid

3M Mark Q Disks Mrs 50 mas

54H \$4 00 100 66H

Grand Rapids MI 4951 MI 800-632-246 600-258-0026 FAX: 616-452-4614

1 MARKETPLACE

the ultimate target market!

They'll DIRECT their attention to PC Magazine Marketplace

products they need and the inhomaton they want regarding price, with If you think that your business can benefit from the \$50,000 heard specifiers whereal PC Materials 10C ME BORTY

So take DIRECT action and call (212) 503-5115

TRAINING/ TUTORIALS

INSTANT REPLAY III Builds Demos, Tutorials, Prototypes, Music

resentations, Time Keyboard Macros, & Menu ns Includes Screen Maker, Keystroke & ine Editor, Program Memorizer, & Arrimator, rived Great Reviews! Simply The Best! 60day satisfaction money back guarantee Demo Disks Aveil IBM & Compatibles \$149.95 Nostradamus Inc. 3191 South Valley St. (Suite 252)

Salt Lake City, UT 84109 (801) 487-9662

TYPESETTING

BOH-TECH TYPESETTING Transmil your lest toll-free, error-law via

modern to your fully automated typesetting system. \$2 per thousand characters \$5 minmum Same-day service 200-typefaces, sizes up to 72 point. Send \$20ppd. for our 200 page guidebook, or call toll-free & use your MC/ VISAIAMEX

Intergraphics 106A South Columbus St. dria, WA 22314

(800) 368-3342 or (703) 683-9414 in DC ama

THE SHOWCASE FOR PRODUCTS AND SERVICES IN THE MS DOS MARKET . . .



E xpect more than a few nibbles this summer from clients and distributors. Ziff-Davis reprints are custom-designed and will make your product's review an attractive marketing lure.

If you're looking to land the big one this summer. contact Jennifer Locke-Reprints Manager, Ziff-Davis Publishing Co., One Park Ave., NY, NY 10016, (212) ZD 503-5447, or on MCI Mail. (Min. order 500 reprints.)

Advertisers product index

RE#	ADVERTISER P	RODUCT PAGE*	* Transcriptors for	PRODUCT Unioci Masteriay
2	Geneal opic Systems	Genealogy Software	223 Traveling Software	
	QUNTING SOFTWARE	Germany Johan		Brooklyn Bridge
15	Agrico Inc Sectors Software Lambed	Abrasin 151 Accounting Software 106	WORD PROCESSING SOFTWARE	AIDS Ventrale
12	Bedlard Seltware Lemited	Accounting Software . 106		Fortware
20	Cougar Mt Software DAC Software	Act 1 Accounting Series 401 Accounting Software 69	137 Sorand Interruponal	Spirit Word Mover
8		Accounting Software 264	218 Bristeam 137 Borland International 139 Computer East Software 215 Concentro Data Systems 502 Group L Corporation	Word Mover
13 58	Practitive Software	Accounting Software 284 Accounting Software 381 Detabase Accounting . 18-19	315 Concertin; Data Systems 502 Group I, Corporation MicroCorn Systems	Relational Reportwriter Memory Lane
	S&T Corp			
ES	C TOP ORGANIZERS			Wordstar 200
	Micro Logic Corp	Ternado	479 Represent inc 250 Symanter Corp 508 Wordperfect Corporation	Regit Wyser Q & A Wyse
DAT	BASE MANAGERS		508 Wordperfect Corporation 513 Wordperfect Corporation	Eutaperfect
71	askSam System	Getabase Managers 86	513 Wordperfect Corporation	
7	Borland International Bultimeasure	Oetobose Monogers 86 Paradox 57 PC File 323	518 Xyount 318 Zvisi Corporation	XYVante III Plus ZY Index
	Concentric Data Systems	Returned Reportement 222	CADICAM	ZY WOOL .
š				
15		Mac Database 64	538 Addson Wesley Pub. Co 475 American Small Business Come	Autocad Training Book
3	Micronin Nantucket Corp	Rhase 176-177	165 Administration	Astrojetch
	Oracle PC Sig	Oloper 413 Database Manager Software 14	165 Autodesk 748 Cad Express 143 Cadam Incorporated	CADICAM
15	PC Sig	Starway 4%	143 Cadam Incorporated	Cad Selfware Cadley 3
12	Personics Corp Research Development Systems	AT Base 63 Lettermanter 390	503 Carkey 126 Computer Vision 192 Foresight Resources Inc	Personal Designer
12	Summeric Com	Q6A30 42	192 Foresight Resources Inc	
÷	Symantic Corp The Public (Software) Library	SWBy The Public SW Library 21	143 Cathley Computer Vision 126 Computer Vision 192 Foreight Resources Inc. 506 Generic Software Inc.	Generic Cadd
	SYSTEMS & ACCESS METHO	ne -		
	Gran Convention	Memory Line 409	323 Funk Software Microsoft	Sideways Noteworthy, Inword
	Marris Com Sunterne			
5	PC Sig The Public (Software) Library		145 PC Sq	Sharewore
9	The Public (Software) Library	S W By The Public S W Library 21	H83 Personal Computer Sappon Personal Computer Sappon Personal Computer Sappon Software Substants S29 The Public (Suffware) Library	Lucid See More
1NA	HCIAL PLANNING SOFTWAR		* Softope Solutions	
_	Intuit Software	Quotum	529 The Public (Software) Library	S/W By The Public S/W Library
5	PC Sig	Sharewore	DESK TOP PUBLISHING	
erc	RMATION MAHAGERS		218 Strovan	Fortware
15	Concentric Data Systems			Page Perfect
			S24 MBL Inc	
	Micro Corn Systems Micro Logic Corp	Mutafunction & Public Domain S/W 16 Torrado 279	Softopic Solutions 299 Swife Interrutional Ltd	Magi: Minter Glightx
_	GRATED SDFTWARE		DATA ENTRY SOFTWARE	690 tx
	GRATED SOFTWARE		174 Form Working	
6	Computer Ease Software \$150	Word Mover 440 Surgraphes 123		Form Wera.
		Sugapas 133	VERTICAL MARKET SOFTWARE	
	DUAGES		523/261 Compact Disc Products	CO FCIN Software
8	Bortand International Crescent Software	Languages Various C2-4, g1 Basic Programming Tools 453	ENTERTAINMENT SOFTWARE	
			727 Potato League Sports	Entertainment Software
1	Microway		COMPATIBLE KEYBGARDS	
PE	TATING SYSTEMS ENVIRONM	IENTS		Compatitie Keyboards
15	Serta Cour Descrition, Inc.	SCD XFM X 386	721 Zeos International	Companie
	Softope Solutions	Software Carbonal	BACKUP SOFTWARE	
_	Softoge Soutiens	Double Dos 339	485 Westlake Data Corp	Backup Software
MOH	RAM DEVELOPERS GENERA		DISK BACKUP & TAPE DRIVES	
	Clarcon Software Crescont Software	uanos //	225. Core International	Combat 2 ft
	Second Security			Ceetast 2 0 Renovable Hard Data Drive Tage Back Up Roppy Data Drive Tage Back Up Size Bodge File Roppy Data Tage Back Up Desarries Data Back Tage Back Up Desarries Database
RO.	ECT MANAGEMENT			Tape Back Up
,	Symanter Corp	Timeline 2 0	193 Kinsan Products	Hoppy Disk Drive
	ISTICAL SOFTWARE		465 Maynard Electronics 173 System Inc 233 Taligrass Technologies 113 Victory Enterprises Technology	5 or Bridge File Floogy Disk
•	Marn Soft Inc	Marn Cad	233 Taligrass Technologies	Tape Back Up
4 9 4	SPSS inc STSC	SPSS PC+ a2 Stargraphics 123	114 Victory Enterprises Technology	urskette Duplicator
			HARD DISKS	
	EDITORS		392 Datran 351 Hard Drives International	Hard Card
18	Command Technology Corp		351 Hard Drives International 341 Lifetime Memory Products	Hard Doks Hard Dok Drues
	NING SOFTWARE PUBLISHIN	0	164 Plus Development	
8	Addison Wesley Pub. Co.	Autocad Training Book	164 Plus Development 181 Storage Dimensions Maxion	Large Capacity Hard Drives
TIL	ITIES		COMPUTERS COMPATIBLES	
	Central Point Software	PC Tools Delust 74		386 System
0	Central Point Software Central Point Software Clanon Software Concentric Carla Systems	PC Tools Debuse Copen Board 74 Copy II PC Debuse Copen Board 75 Claren 70	493 Advanced Logic Reserch 270 After Technology Corp 111 Arche Technologies	
•	Canon Software	Caron 70 Relational Responsertor 222	111 Arche Technologies	
ő		Rasic Programmes Tools 453	166 AST Research 275 Bertiev Cornecters	Computers Competities
10 10 14 15 10 10 16				Computer Accessories
6			Compaq Computer Corporation Compu Add	
8	Executive Systems Fifth Generation	Xines 281 Printer Sharing & Utilities 225	Compu Add	Compatities
8	Fura Software		254 Compu Add 163 Computer Products United	PC x
,	Funk Software Golden Bow Systems			PCs PCs
2	Group L Corporation Harmerly Computer Services, In	Nemony Lane 409 Pro Bale 334 Multifunction Fold Domain S'W 18	379 Dyna Computers	386 PC PC Computers Design Computers
	Harmeny Computer Services, In	Pro Bas 334 Multifunction Pub Domain S/W 18		PC Compatibles Desistos Computers
	Micro Com Systems Micro Looic Caro	Torrado 279	216 Evens Systems, Inc 159 Evens Systems, Inc	PC Computers
		Forrado 279 Goter 341 Unites 255	740 GE Comouter Service	Corrector
	Mandec	Utilities 235	124 Hyundia	PC Compatibles
A .	Personal Computer Support Personal Corp	United	362 Inteligent Microsystems 102 May Computers	Clone Computers
3	Personics Corp Quaid Software Ltd	See More 408 Utilities 405	102 May Computers 314 New York City	PC Used PC's
		Paraget 400		Used PC's 385 At Machine
	Rose Electronics			
	Rose (lectronics Softgac Soutions	Desi Optimuse 49		
	Rose Electronics Softagic Salutions	Desi Optimuse 49 Software Carbesel 339	372 PC Designe 298 Samsung	Compatible AT OT Compatibles
	Rose Dechance Saltage Sautions Saltage Sautions	Des Optimuser 49 Software Caronsel 339 Cust 339	372 PC Designe 298 Samsung 390 Speed Computer Systems	AT OT Compatibles PC's
	Rose (lectronics Softings: Solutions Softings: Solutions Softings: Solutions Softings: Solutions Softings: Solutions	Personal Communer 49 Software Converse 239 Conf. 239 Mag-c Marge 239 Conf. 239 Mag-c Marge 239 See Delimoner 239 See Delimoner 239	372 PC Designe 296 Samsung 380 Speek Computer Systems 254 Son Microsystems 272 Teacher Com	PC's Sun 1990
19 10 10 14	Rose Electronics Softagic Salutions	Disk Optimizer 45 Software Cartesteri 339 Cubrit 339 Magic Merror 335 Disk Optimizer 339 Device Dos 339 Devices Dos 339		ATAT Compatibles PC's Sun 1988 PC PC PC PC WY700 Graphic System

\$#	ADVERTISER	PRODUCT	PAGE# RI		FRIOUCT	PAG
NPU 50 44	TDEVICES		26	5 Noveling 2 DCC Systems	Service Response System	. 312-
4	Cheony American Key Transc	Keytourds Restroic Mouse	300-301 77 300-301 79 104-105 16 467 22	PCC Systems Rose Electronics Software Link, Inc. 1095		
	Logitect No Triguite Computer Systems	Keytronic Mouse	104-105 35	3 Software Link, Inc.	Lamen SX Correctivity	
	Northgate Computer Systems Summanisations	Keyboard Bit Pati Plus	104-105 19 447 22			- 60
06	RAMMERS TOOLS UTIL	TIES		ICRO-MAINFRAMI	LINKS	
-	State Computing Crescent Software	Blase Compiler Base Programming Tools	438 53	DCA Garway Communi	ations UAN Gathway	. 370-
	Crescert Software	Basic Programming Tools		ODEMS	aren (AT SIEVE)	
	Hammerly Computer Services, in Software Masters Software Masters	Pro Bas Programmers Tools	334 14	ODEMS	2400 BFS Modern	
		The Visible Computer	468 36	ATI Technologies In Microsom, Inc.		
м	ON BOARDS		23		Modern Modern	
_	AST Research	Farrgage Plus	. 335 36	4 Ven-Tel		
	Central Point Softwars The Commists DC	Rangage Plus Copy is PC Deliuse Option Board The Complete Fax Add in Board	335 36 74 ED 250 36 384-397 36		DCOL CONVERTORS (2): Term, Emulator Software	
	The Complete PC Wordperfect Corporation	Add in Soard	304-307 36		U2-1erm, Emulator Software Term, Emulator Software	
AN	NERS DIGITIZERS			SKETTES	The District County of the Cou	
		Digitizer Family Ad Scanners Namey Scanner 3000 The Complete Hard Scanner	146 -		Magnetic Media .	
	Calcomp Chinon Diamond Flower Electric Instru	Scarners	171 36	Teshba 7 Mawii	Downes	
	The Complete PC	The Company Mart Suspens	273 III	SURANCE		
	TERS	THE COMPANY INC. LEGISLE	72	8 Sylevare	hauro	
17	Advanced Matrix Technology	Det Matrix Frinter	200,201 P	OWER PROTECTIO		
			. 212-213 14	 American Power Co 	rverson Corp UPS	
	Buffale Products Citizen America Printer	SX Peripheral Sharing Devices	212-213 14 236 16 38	7 Kensington Microw 1 Paris Systems Inc. 3 PC Gooling System 5 Universal Vectors G	ere Ltd Masterpiece	
	Chash America Printer Destiny Technology	Protes Laster Act I	439 47	PC Cooled Services	Power Supplies	
		Descert	. 211 29	5 Universal Vectors C	Op Unisage	
	Hewlett Packand Marmesman Tally	Casenet Proters	209 \$			
			264 29	5 Universal Vectors C	rp Unsavel	ettern.
			355 P	CACCESSORIES		
	Quine Corp Book of America	Crystal Print Line	435 20		PC Accessores PC Accessores	
	Selegisha Corp	Laser Printers Printer	226 47		Corp PC Accessories Corp Replacement Battery	
		PS \$10	294-295	e interceonal Earles	Com Satteres	
	Toshou	Laser Printers. 007 Majoru Printers	294-295 27	8 Interrutoral Safer 9 Interrutoral Safer 2 Kensington Microw	Corp Sutterns in Ltd PC Accessories	
	TER RIBBONS	QUI MORRIX PTICRES	326	4 Key Transc	Nay Tronic Mouse Saleskin	300
4	EN HIBBONS		326 34	Key Tranc Merrit Computer P PC Cooling System	nducts Saleskin Power Supplies	
-	National Computer Rébons TER ACCESSORIES	Physics Robons		AIL ORDER	Total Sopposi	
IN.	TER ACCESSORIES	Prot Note: I	304 10	6 707 Computer Sale	Mar Order	
	Bay Technical Associates Fifth Generation		304 12	1 American Servicion		400
		Porter Masterswitch	- 225 Si 400 33	6 Arlington Computer Bay Express	Products Mai Order	
	Rose Electronics	Masterswitch				296
11	ABLE LAP COMPUTERS					
-	Mitsubsite Electronics	Laptop	90-51 48	1 But Dog Computer	Products Computer Accessories	428
_	Zenith Oata Systems	Laging	90-91 48 271 13	6 Bus Computer Syst 8 CAG Express		216
F				Compu Add	Compatities	216
_	Quadran Corp	JT fax	366 25 20 20 350 351 10	4 Compu Add	Compatities Mai Droer Mai Order Mai Order Mai Order Mai Order Mai Order	220
P	LAYS MONITORS TERMI	NALS	24	6 Computasses 6 Computer Direct	Mai Order	220
	Correrstone Filte Rusiness Applications	Monochrome Monitors	350-351 12 407 15	Gomputer Discount Gomputer Mai Ord Gomputer Mai Ord Gomputer Majo Pro	Warehouse Mai Order	476
	NEC Horse Flectionins Inc.	Monto: Mutopro II	407 15 124-125 22	9 Discourt Myon Pro	Mai Order Sucts Moi Order	324- 64
	MEC Home Electronics Inc Princetor Graphics	Muttyre XI, Monter	382-383 52	 Electronic Wholesa 	e House Mai Order	
	Princetor Graphics	Monitor	278 29 277 28	1 F & W Communicat	ons Mai Order Coro Mai Order	
	Princeton Graphics. Snarp Professional Products	Montor QA 25 Overhead Display	277 25	F & W Communicat General Technolog Hard Drives Interni Jude Computer Pro	Corp Mai Order tonal Mai Order	
	Sigma Designs	Laservere .	. 430 25 302 24	3 Jade Computer Pro	sucts Mai Order	
A.F	HICS SOFTWARE		124-125 22 382-383 52 278 28 277 277 28 277	5 Jameo Electronics 8 JOR Micro Devices	Mai Order	
_	Sam Weer lan	Form Work	. 187 19	2 May Computers 7 MH Warehouse		
		Flow Charts	338 38	7 MH Warehouse Management		
	Micrografii Software Publishing	Graphics S.W. Windows Presenta Harvard Graphics			Mail Oxfor Ribbons Mail Oxfor	
				8 Ornega Press		
	Zenographics	Graphics	. 140 17	5 On Line Store 9/211 PC Brand		264
ıτ	TERS CHARTING DEVIC	ES .	31	5 On Line Store 9/211 PC Brand 6/309 PC Brand	Max Crobe Max Crobe Max Grobe Max Crobe Max Crobe Max Crobe Max Crobe Max Crobe Max Crobe	- 1
_	Mutoh America Inc	Ploters			Mai Cirdor	260
•	O ORAPHICS BOARDS		1N 18		rly INT) Mol Order	
~		VSA Board	174 18	5 S.C. Systems 4 Stamrock Softine	Mai Order	
	Gence Systems Corp Facadree Systems STB Systems				Mai Order Mai Order Mail Order	
	\$18 Systems Video-7		154 389 27	4 Suntrancs 6/123 Televian	Mail Order	194
	Video-7 Wordperfect Corporation	Fastwrte-VGA Board Graphics Video Croplay	265-247 25 366-387 25	B Tassay Common C		194
		An allowed a state of control of the control		8 Tussey Computer F Warehouse Data Po		200
	LERATOR BOARDS		52		for Mail Order	
	Hauppauge Personal Computer Support	Moherboard		RGANIZATIONS'S		
-	MUNICATIONS SOFTWA			2 Calmers Exposition	Group Information Management Show	
MI.	TORICATIONS SOFTWAI		40 D	RECT MARKETIN	OCONNECTION	
	Computer Ease Software Data Storm Fechnologies Inc.	Communications Software	202 1	E. 302 Computer State		
	Mendian Technology	Communications Software Communication Software CC Mail	388-389 53	 American Servicon 	tuctor Mai Order	
	PCC Systems	CC Mail	341 33	6 Artington Compute	Products Mail Order	400
	Mondain Technology PCC Systems Rate Electronics Software Traveling Software White Crare Systems	Pessport Morpe II Destors	130 11	6 But Contoutes Sun	luctor Mail Crefer Products Mail Crefer	
	Traveling Software	Deskink	198 74 28 10	8 Cad Express	Warehouse Mai Order	- 401
	White Crane Systems	Brooklyn Bridge	28 10	6 Computer Discourt	Warehouse Mail Order	471
	L AREA NETWORKING		55	 Electronic Wholesall F.A.W.Communical 	e House Mail Order	
CA	A.S.P. Computer Products American Power Conversion Corp.	Simplan		3 Jade Computer Pro	nicls Mai Greer	
CA	American Power Conversion Corp.	UPS	300 10 200 10 200 30	6 Jameco Electronics	Mai Order	
CA		Local Aves Networking	236 10	8 JOR Micro Devices MRS Warehouse	Mai Order Mai Order	
CA	Asian Bullion Products		10.70		Mar Order	
A	Axon Bullalo Products OCA Cresstatic Communications	MARK IV				
	Axin Suffaio Products OCA Cressalt Communications OCA Cressalt Communications	LPS Local Area Networking S.X Pempheral Shaning Devices MAJOK N Remote	78 34	4 National Computer	Ribbons Mail Order	
	Asian Buttile Products OCA Crestate Communications DCA Crestate Communications DCA	Remote 10 NFT	78 34 88-99 11	4 National Computer		
C.A	DCA Excel Tech Gateway Communications	Remote 10 NFT	78 34 88-99 11 398 30 307 10	4 National Computer 5 De Line Store 33 PC National 15 De Sei	Mai Orber Mai Orber Mai Orber	
CA	Asian Products DCA Crestate Communications DCA Crestate Communications DCA Crestate Communications DCA Escal Tech Garreng Communications Natine Novel Inc.		78 34 88-99 11	Material Computer S On Line Store S PC Network S PC Sq. M Sharenee		

AFTER HOURS



Letting Mentor Be Your Guide

BY JENNIFER ZAINO
Webster's Ninth New Collegiate
Dictionary defines 'mentor'
as ''a trusted counselor or
guide.' Profit Technology's
Breakthrough! Mentor program
attempts to exemplify that definition by helping you improve
your learning skills and increase
your powers of retention, but it
has mixed results.

has mixed results.

Mentor is a more sophisticated version of the method used in grammar school to teach multiplication tables. But in place of a grim-looking teacher flashing index cards in your beddled face. Mentor less you set up to five alternating windows that flash information while you're working in application programs.

You choose topics to review from the 60 general business library likes included with Mentor, or from the separately sold VIP (Very Important Points) libraries. At present, these include 2ig Zigar's Secrets of Closing the Sale, The WordPerfect VIP, and The ABCs of MS-DOS. If you have Mentor's parent Breakthrough! software,

however, you can build your own flash file libraries. In order to run your flash file

In order to run your flash file libraries over applications, you must first load your programs into ProView!, a multitasking, TopView-compatible program manager that is part of the Mentor package.

The pop-up ProView! menu gives you access to a wide variety of operations, including resizing, sliding, freezing, hiding, zooming, and scrolling program windows.

While it's not required, you'll find that you'll be able to use ProView! much more efficiently if you have a mouse. If you rely on the keyboard, you'll get into the awkward situation of using the Home key for mouse button 1, the PgUp key for button 2, and the Alt key for button 2, and the Alt key for button 3.

Unfortunately, ProView! has inherited some of Top-View's flaws. For instance, changing between program windows, even if they are onscreen at the same time, is a tedious three-step process. And ProView!'s Cut and Paste functions are nearly as mysterious as those found in TopView. You'll find that you may not be able to access these functions until you create new filter tables to inform ProView! of the keystrokes that your application programs need in order to perform these opera-



The Mentor menu lets you | to register that the message has

tailer the learning process to suit your needs. You can choose to have Mentor's windows display the tist attempt the many or you might prefer to have them flash different library to matter

The flashing information might be couched in a question format, in motivational prompts, or even in inspirational quotations. The program will continue to replay each library file until you choose to stop it.

You can set the Reshow intered speed and Duration time of each Mentor window. However, if you want to run more than one Mentor window over an application, you'll have to play around with these settings so that the windows don't appear on-screen at the same time. I found that I would lose

control of my keyboard if windows even slightly overlapped at any given point. The only way to have multiple windows flashing on-screen simultanneously is to work directly in the Mentor program itself.

Are you thinking this all sounds like "subliminal seduction"? Shades of Coca-Cola ads on movie theater screens, perhaps?

Profit Technology claims that to be truly subliminal (and, the company says, less effective), a message has to be flashed on-screen so quickly that your eye won't even be able

to register that the message has
t ever been there.

Mentor differs from this in that its attention-getting, flashing windows force your eye to acknowledge the information, no matter how briefly the display is in view.

This technique reflects the

findings of the Kramer Report, a study that established that the amount of eye fixation on a piece of information is directly related to the degree of its retention. The Kramer Report also showed that a message that is heard or read once is completely foogotten in 30 days. However, if a message is read or heard several times a day for at least 8 days, 90 percent of it is retained in memory, even after 90 days.

Profit Technology is on the right track by incorporating what could be a very effective learning technique into Mentor. However, the program needs some revamping to make the learning process not only more effective, but less troublesome

as well. List Price: Breakthrough! Mentor, \$195; Zig Ziglar's Secrets of Closing the Sale, \$29.95; The WordPerfect VIP and The ABCs of

MS-DOS, \$49.95 each. Requires: 256K RAM, two disk drives, DOS 2.0 or later. Mouse recommended. Copy protected. Profit Technology Inc., 17 Battery Pl., New York, NY

10004; (800) 223-4628.

CIPICLE 605 ON READER SERVICE CARD



plicaox can size, ad e withlike tion using View'



Seconds Never Looked So Good!

ttract potential customers, distributors, and vendors with our tastefully designed reprints. Revitalize your article with front page coverage from one of the world's leading computer magazines.

Ziff-Davis reprints are concisely reformatted on 80 pound coated paper and printed from full

color to black and white.*

(212) 503-5447.

To find out how you can have your article reprinted, call or write today.

reprinted, can of write today.

Jennifer Locke-Reprints Manager,
Ziff-Davis Publishing Company, One
Park Avenue, New York, NY 10016,



resrumum order 500 reprints.

AFTER HOURS



A Star Trekkin' Space Odyssey

BY DONALD B. TRIVETTE The year is 1997. Your job is to oversee the construction of the United States' first commercial space station. You have an enormous complement of equipment and employees to do the job, but you're on a very tight schedule. Should you fail to complete the project on time. Space M+A+X Enterprises will be liable for damages at the rate of \$4,550,000 per day until the space station is built. If you're willing to take that risk. then Space M+A+X, from Final Frontier Software, is the game for you

Space M+A+X is not a game you'll pick up in a few hours . . or days . . or even weeks. In fact, it's not really a game, but rather a detailed simulation of space station assec station assect station assect station asset with the proper of the Medeovour—with the proper equipment, personnel, and supplies, and then oversee the launch.

Once the spaceship is in the correct orbit, you've got to dook with the parts you've already assembled, assemble the modules you brought up, and then return to earth to fetch the next stages. You've also got to schedule a crew and arrange maintenance on the orbite.

What makes Spoce M+A+X interesting is the authenticity of those details. The program was written by T. S. Keller, formerly with the Let Propulsion Laboratory, who developed the system used for resource management in the Mariner, Viking, and Voyager space missions. The manual—really a detailed book about NASA's actual space-station project—reads like something the Russians



M+A+X menu screen. You also have to keep an eye on the weather report.

would pay big bucks for. In the section on altitude and inclination, Keller says:

"When the Orbiter is launched from KSC [Kennedy Space Centerl in an easterly direction, full advantage of Earth's eastward rotation can be used as a springhoard. This is in sharp contrast to military launches from Vandenberg Air Force Base in California. For these launches, near-polar orbits (north-south) are required. Polar orbit launches cannot take advantage of any springboard effect. As a result, the maximum payloads are on the order of 40,000 pounds (40 percent less than eastward launches from Kennedy)."

If you love detail, space exploration, and high tech, you'll enjoy playing Space M+A+X; if you dislike figuring food and oxygen consumption for a crew of eight, you should stick with arcade games.

List Price: Space M+A+X, \$59, 95. Requires: 192K RAM; one disk drive; IBM PC, PCJr, or compatible, or PS/2 Models 25 or 30 (hard-disk installable, but copyprotection scheme prevents installation on PS/2 Models 50, 60, or 80); CGA, EGA, or VGA; DOS 2.1 or later. Flant Frontier \$50ftware, 18307 Burbank Blvd., \$408, Targana, CA 91356 (st8)

996-0431. CIRCLE 697 ON READER SERVICE CARD

EDUCATION

Sexu-Cation: The

Facts of Life On-disk BY MITT JONES

Whether you learned about the proverbial birds and bees from your parents, schoolyard whispers, or pirated Playboy magazines, chances are you don't know as much as you thought you did. In a world in which teenage pregnancy is on the rise and misconceptions about AIDS abound, it's important to ensure that your teenage children know the facts.

Datachem's Sexu-Cotion, a software learning tool designed for family use, covers venereal diseases and AIDS, as well as the human anatomy, in a factual and level-headed manner.

The program lets you choose to answer randomly selected or topically oriented multiple-choice questions. A correct answer advances you to the next question; an incorrect answer leads you to a summary of the knowledge you apparently lack.

After each set of 10 to 15 constitutions of the computer discussions.

questions, the computer displays your score, rating your knowledge as a percentage of correct answers. Neither your answers nor your score are written to disk, so you need not worry that someone will stumble across evidence of your sexual ignorance.

ignorance. You then have the opin of reviewing the questions you missed or proceeding to more questions. Xexa-Cotion divides the questions into three categories: the structure and function of the reproductive systems, sexually transmitted diseases, and contraception. The coverage of each category is tasteful, to the point, and in-depth—reminiscent of the sex-education films I watched in high school gym class. Of course, there are no pictures.

The difficulty of the questions ranges from basic to complex. The more complex questions are sure to teach even the more sexually aware among us a thing or two we never knew or have forgotten. The authors of the program did a nice job of omitting value judgments from their questions: a note in the manual urges parents to "review the information and the appropriate uses of the information of the program of the proting of the protion of the prot

It's your choice. You can hope your child is shown films in gym, have a few drinks and do the talk in g yourself, or cough up the \$59.95 for Sear-Cation. As Datachem points out, however, one of the biggest advantages to Sear-Cotion is its impartial presentation of the facts through an interesting medium. Along with a bit of parental guidance. Sexu-Cotion should give you rehild an obbe-should give you rehild an obbe-should give you rehild an obbe-

tive, knowledgeable viewpoint of sex that he or she may not get elsewhere. List Price: Sexu-Cation, \$59,95; working dame, \$20,05 (can be

LBM FIRE: SELECT AURON, 3597, SC (2010)
working demo, \$20,95 (can be applied toward purchase of full product). Requires: 256K RAM, two disk drives, DOS 2.0 or later. Not copy protected. Datachem, 33 M1. View Dr., Westborough, MA 1581; (800) 225-5669; (617) 366-

CIRCLE 696 DN READER SERVICE CARD



EDITORIAL PRODUCT INDEX



PRODUCTIVITY		
DEPARTMENT	PROGRAM HAME/DESCRIPTION	PAG
PC Lab Notes	Optimizing the size of Microsoft C, QuickC, and Turbo C programs	34
Utilities	RAM/VEW displays ASCII strings and hex sequences in any area of memory.	36
Environments	8000S2's menu processes key and mouse input to the Presentation Manager.	39
Power Programming	OFN C and TRYOFN C qualify pertial filenames with a full drive and path	41
Sareadsheet Clinic	Bug in Bortand's Quartro when evaluating certain (I/O formula)	42
Spreadsheet Clinic	Macros return to a 1-2-3 cell and display the same screenful as before	42
Spreadsheet Clinic	Formulas to center and right align the results of 1-2-3 string formulas.	42
Spreadsheet Clinic	(IfKey) is an undocumented macro command in 1-2-3. Release 2-81.	42
User-to-User	RETRADEM BAT changes drive and directory in batch file and returns later.	43
Uner-to-User	READOATE, ONCEONLY, and CURRENT batch files run a program once every day.	43
Power User	Getting single-keystroke access to dBASE III Plus's FIND capability.	43
Power User	A "meta-macro" that simplifies storing updated Microsoft Word 4.0 macros.	43
Power User	Sorting WordPerfect records in chronological order on the date field.	43
Power User	Making Microsoft Word 4.0 recognize key symbols as text, not as commands.	43
Power User	Tabs in WordPerfect headers to align columns of proportional-font text.	44
Power User	Clipper link times using PLINKBS, Microsoft's linker, and Turbo CTLINK	44
Languages	PATHSUS C makes substitutions to any Master Environment Block variable.	44
Languages	A "bouncing-ball" menu for use in games, in compiled BASIC source code	44
Languages	Turbo Pancal No-PrtSc program disubles or enables the PrtSc key	45
Languages	Turbo Pascai 3 0 PriChar procedure essilv meniguistes screen colors.	45
PC Tutor	Passing arouments from DOS batch files to interpreted BASIC 3.0 programs	45
PC Tutor	Why you shouldn't remove the COMSPEC entry from the DOS environment.	45
PC Tutor	Programming DOS's LISEEK function to move a pointer through a tend file	45
PCTutor	Explaining the DOS ERRORLEVEL command and using DSKREADY in a batch file	46
Connectivity Clinic	NETERROR uses Hauadahi's "Inside NetBIOS" book to find errors on IEM LAN	46

NETISICS monitors commends sent to NetISICS services in NetWork and VINES

COMING UP

C COMPILERS Are there really differences between C compilers? Decide for yourself as PC Labs puts 14 compilers through a battery of benchmark tests. The compilers reviewed include products from Microsoft Corp., Borland International, Lattice, Watcom, MetaWare, Manx Software Systems, Ecosoft, Computer Innovations, C Ware, Mark Williams Co., MicroWay, and Mix Software. You'll see how interpreters from Rational Systems. Gimpel Software, and Age of Reason stack up in the current market. We've also developed a checklist to verify if the C compilers and interpreters conform to the emerging ANSI C standard.

MASS STORAGE TO GO The days of carrying a briefease full of floppy discarrying the reason wer. And removable data carridges like toose from lonega and Eastram Kodak aren't the only alternatives anymore. Respective for the respective for the postule for postule for picture and make it possible for you to take your hard disk wherever you go. It's the pricture and make it possible for you to fast your hard disk wherever you go. It's the pricture and make it possible for you to fast your hard disk wherever you go. It's the pricture and make it possible for travelers, he security conscious, and people who work from many different computer. PC Labs tests many different computer. PC Labs tests for the properties of the properties

MUSIC MANIA Music packages for the IBM CPt datallow you to kake ful ofthe IBM CPt datallow you to kake ful davantage of the MIDI (Musical Instrument Digital Interface) standard are becoming more sophisticated. Sequencing programs MIDI commands. All you need to compose your own music is a sequencing package, a MIDI interface card. a synthesizer, and your PC. We look at the best of the bunch from Passport Designs, Voyanties, Twelf-Technologies, Magnetic Music. Twelfve Technologies, Magnetic Music. Twelfve cents, and LTA Productions.

Notation packages actually enable your PC to write a music manuscript. Notation packages from Dr. T's Music Software and Passport Designs and combination notation and sequencing packages from Roland Corp. and Jim Miller create beautiful music manuscripts.

AFTER HOURS



The Seven Spirits of Ra: Adventures in the Land of the Dead

BY JENNIFER ZAINO

Is your favorite color Nile green? Does the song "Walk Like an Egyptian" get you out on the dance floor? Would you pay money to see Steve Martin decked out in King Tut designer wear? If your answer to any of these questions is yes, you probably are a confirmed Egyptophile. As such, you'll want to check out Sir-Tech Software's adventure game, The Seven Spirits of Ra.

The game is based on the ancient myth of Egypt's first pharaoh, Osiris, who was murdered by his evil brother Set. As if murder weren't bad enough. Set then chopped up Osiris's corpse and scattered the pieces for the creatures of the earth, sea, and air to feast upon. Besides being a gory thing to do, Set's act of butchery placed Osiris's seven mortal spirits in danger, as their immortality with the god Ra could be secured only if the earthly body was in one piece.

As Osiris, you must bring at least one of your spirits safely through the Duad (Land of the Dead) in order to gain entrance to the Passage of Rebirth and finally to the Stronghold of the wicked Set.

Most of the game's action takes place in the Duad, which is composed of the Desert (complete with pyramids and glaring sun), the Swamps of Sebat (complete with crocodiles and swamps), and a series of mazelike landscapes bearing such names as the Caverns of Isis and the City of Tombs.

You move from one part of the Duad to another through doorways marked with flashing ankhs. Searching for weapons, treasures, and nourishment in the form of mushrooms, you navigate through the various regions using either the arrow keys or a joystick. The objects of the search reflect the ancient Egyptian religious belief that spirits wandering in the Duad will confront mirror images of earthly things, and that they will also need food to sustain themselves and riches to offer as gifts to the gods.

You're constantly fighting the onslaught of mummies. ghosts, snakes, rats, crocodiles, vultures, and other assorted nasties. Battline these bullies is good training for the ultimate confrontation with Set in his stronghold. Each time you lose a battle, a semitransparent version of Osiris, representing one of the spirits. floats away. It's through the Land of the Dead in the Desert. He can move to other marked with antho ******

one of the game's more-extraordinary special effects.

If you should lose all seven spirits, you are immediately sent to the hellish Pits of Abat. from which there is no escape. Since it's easier than you think to lose all the spirits, you'll want to save the game often. Unfortunately, saving the game requires that you quit and be bumped back to DOS.

Part of the challenge lies in reuniting Osiris's body by destroying the five Masters of Beasts, which are the spirits of the creatures who feasted upon the flesh of the first pharaoh. You can then assume the shape of the defeated creature at will. Believe me, this little trick can come in pretty handy when you're trying to pass unnoticed through crocodile-infested waters or chambers filled with slithery snakes

You'll also have to decipher messages that might contain answers to riddles that will be asked of you in the Duad and along the Passage of Rebirth. You might find some other helpful clues in the opening screens that appear before you enter each region of the Duad. or even in the manual.

Unfortunately, some of these clues were, literally and figuratively, all hieroglyphics to me. If you, too, get stuck, there's no need to go crying to your mummy-the company's hot-line support service is open

7 days. When you become good enough to move to an advanced game, though, you're on your own. The company says it is unable to answer these questions because of the variability of the advanced level's universe.

The Seven Spirits of Ra's 16color, high-resolution graphics are to be highly commended. Up to 60 animated, multicolored figures can be present onscreen at the same time. On an EGA monitor, the effect is very

My one complaint with the program's graphics is the depiction of the killer rats. It's pretty hard to be afraid of something that looks like a long-tailed hockey puck topped with a maraschino cherry.

The well-researched manual and authentic graphical depiction of the Osiris myth make the game as educational as it is entertaining.

Now, instead of passively watching reruns of Cleopatra, Egyptophiles (and other game lovers) can actively participate in the adventures that await them in the Land of the Dead. List Price: The Seven Spirits of Ra. \$49.95. Regulres: 128K RAM. one disk drive, CGA or EGA, DOS 1.0 or later. Copy protected. Sir-Tech Software Inc., P.O. Box 245, Charlestown Ogdensburg Mall, Ogdensburg, NY 13669; (315) 393-6633

CIRCLE 800 ON READER SERVICE CARD



lenty of chaes ome of these



INDEX TO ADVERTISERS

106 536 693 322 317 242 270 140 521 475 185	707 Sales Addison-Wesley Advanced Logic Research Advanced Matrix Tech	482	220	CAC Software Data Access Corp Datasterre Tech Data World Certan DCA DCA-Crossian DCA-Crossian			Merrit Computer Products .	365			
322 317 242 270 140 521 475 185						347			298		
322 317 242 270 140 521 475 185			375			387	Mici Warehouse	499	245		
242 270 140 521 475			504						470		
242 270 140 521 475						388	Microsom Inc Microsom Inc Microsom Systems Microsoptick Microsoptics Microsoptics Microsoptics Microsoptics Microsoptics Microsoptics			Samsung Corp Santa Crea Operation Inc 3017 5 C Systems Selected Corp Sharrook Sharp Electronics	
270 140 521 475			192						498		
270 140 521 475	Alps America		531						184		
140 521 475 185			278						119		
521 475 185	Attencan Power Conversion		226			526				Signs Designs	
47S	American Semi Conductor	444	522			260			252 478	Softklore Softine Softine	
185				DEI Computer Products Deil Computer Products		178					
	American Small Eusiness		536 533								
	Aptach Inc. Arche Technologies					1:			334		
111			258				Microsoft				
	Artington Computer		747			221			726		
	Artington Computer Products Astron-Tate askSam Systems ASP Computer Products ASP Computer Products		742	Oeta Technology Ossany Technology Ossany Technology Oscoent Micro Products		271	Microscy Mississhi Musish America		447	Software Exchangers Software Masters Software Masters Software Publishing	
324			229			323			488		
471			229	Dyna Computers Electronic Wholesale		524	NSI Inc. NEC Home Electronics NEC Home Electronics				
230			520			121			290		
107			511		407	115			129		50
166	AST Research AST Research		219	Everes Systems		196			S17	SPSS STB Systems Storage Dymensions	
540											
	ATI Technologies		159	Everex systems Excellent inc		110	Nusdec		121		
165	Autodesk		525			344	National Computer Ribbons		150	STSC	
204			276			147			744		
395			352			354					
	Avery Avery Buy Express Buy Technical Associates		288	Executive Systems FASTMCR0 Fifth Generation Foresignt Resources Inc Form Wasx Inc			Netine New York City Northgete Computer Northgete Computer		254	Summagraphics Sun Microsystems Sun Microsystems	
172			122						274		
482 275	Betford Software Berriey Computers		174			123	Revelling Revelling		299	Swite International Symantec Corp Symantec Corp	
			112	Fox Software		285			745		
216			323			235			250		
116	Bristyeam Blaise Computer		331	Funk Software F & W Communications		368	Okrista Omega Press On-Line Store			Symunec Corp Symunec Corp Syspen Inc Taligratis Technologies Tandon Teleman	
116									249 173		
	Boths Limited		146	Galeway Communications		175					
377	Borland	67	740	GE Computer Service			Oracle Panasonic		233		
137	Borland		122			119					
138	Borland Borland	C2-4	266	GenetLogic Systems General Technology Generic Schware Genea Systems Golden Bow Systems		381	Para System Peradise Systems		206		
			506			350			123	Teleman Teleman The Complete PC The Complete PC The Laser Connecton The Public S W Library The Sethware Link Tors.	
326			223						144		
461	Buffus Products Buffus Computer Bus Computer Bus Computer Bus Computer Bus Computer Button/Mare Inc Cad Expenses Cadam Inc		369			311	PC Brand PC Brand		254		
135			502		411	308			259		
494			389	Group L. Harmerly Computer	334	309		25	529		
748			351			301		26	393		
143			276	Hard Drives Int I Hauppauge Computer		303	PC Brand PC Express PC Express	353			
503									191		
	Cad Key Cabners Graup		201	Haventree S W Hewlet: Packard		304	PC Express PC Connection		1 :	Toshea Toshea	
492			342						1:		
730	Calcomp		339	Hewlett-Pechant	211	473	PC Cooling .	50		Toshba	485
160	Central Point Central Point Central Point Chicony American Chicon Chicon America		124	Monda	455	377	PC Designs PC Network	352	231	Touchbase Systems Trensec Systems	
120			499	MS.	17	353		472			
750			382	Intelligent Micro Systems International Battery International Battery		145	PC Sig PCC Systems Practities Software		223	Santac Systems Tasser Computer Universal Vectors Ver Tel Verlex Systems Vectory Enterprises Vectory Enterprises Water Computer	
319			198			722			268		
114						358			295		
134	Garge Software	70					Persoft		364		
188	Claride Software Command Technology	229	221	Injut Software Jonese Invest Magnetics Jade Computer James		366			329		
						489	Persoft				
\$23/26	Compact Disc Products	434	219				Personal Computer Support		113		
:	Compaq Computer Corp		243				Group		127		
	CompuAdd Corp		346			483			171		
294	Computed Corp Computasses			JDR Kensington Microware Kensington Microware			Greep Personics	11-13	485		
205			197			585		63	312		
246	Computer Direct	84-87	272				Personics Plus Development		529		
109	Computer Discount Warehouse	476-477		Keytronics		164			513		
130	Computer Ease Software	440	193	Kinson Products Lifetine Memory Products Logiech Lotes	750	727				Whole Earth Computer Wordperfect Corp Wordperfect Corp Whyse Technology Myse Service Zenith Data Systems	200
183	OUR DANIE CASE SOURCE	440	341	Named Laboratory	239	208	Lacent Fundan Shouts	450	734	TTV-194-14-1-1013	312
163	Computer Mail Dirder Computer Products United	254-252	341	Lifetime Memory Products	426	208	Princeton Graphics Princeton Graphics Duadram	146-277	/34	MASE INCHARGOSA	545-543
163	Computer Products United	2-3	182	Logeect	m4-105	209	PTINCETON SITEPINGS	129	\$18	хуфия	- 97
126				Lotus	161-168	180	Budram	366	337	Zenith Data Systems	271
315	Concentric Data	222		Maceta fre Mannesmann Tally	284	1 .	Duard Software	453	325 723	Zenographics Zeus International	144
225	Core Internetional	321	224	Mannesmann Tally	244	361	Dume Core	435	723	Zeos International	377
225 258	Concentric Data Concentric Data Core Internetional Cornerstone Cougar Mountein Crescert Sotware	350.351	224 154	Mathself Inc Maxel	221		Buard Software Burne Corp Research Development Buch	396	721		
194	County Mountain	481		Mount	45		Donk	214	216	ZyLAS Corp	477
360	Constant Colores	***	102	Mr. Committee	440	479	Rightsoft	- 40	-10	1,000	-
472	Crescert operant	455	465	May Computer Maynard Electronics Mendan Technology	39	290	Programme	440		Reader Service it Please call advi	
472	Curts Mig Curts Mig	347	221	Mayhare Electrofiscs	231	776	Rose Electronics Safeware	400	interm	neater person of Prease call adve	Z1000F HDF

PC MAGAZINE ADVERTISING SALES STAFF Sr. Advertising Coordinator... Jane L. Gottlieb Advertising Coordinator... Ursula D. Eckel Park Avenue, New York, NY 10015 (212) 503-5100



AFTER HOURS



Full Speed Ahead: Test Drive Lets You Open Up on the Open Road

BY PHILIP F.H. ROSE Imagine that you have unlimited resources to spend on the ultimate sports car. Five of the top models-a Lamborghini Countach, Lotus Turbo Esprit, Porsche 911 Turbo, Ferrari Testarossa, and Chevy Corvette-are completely at your disposal for test-driving along a treacherous mountain road. This is the premise of Test

Drive, an action/simulation game from Accolade. Test Drive is not a racing game: it's strictly one player at a timejust you against the road, the Sunday drivers, and the highway patrol. Scoring comes at the end, as a way of keeping track of how well you did. Action is this game's stron-

gest point. Don't play Test

AFTER HOURS INDEX

The Seven Spirits of Ra Travel with Egypt's first pharaoh through the Land of the Dead Space M+A+X Set up the U.S.'s first

commercial space station in the not-too-distant future Sexu-Cation A program to teach your teenage children the facts

about sex Breakthrough! Mentor Electronic flash card program lets you soak up information while you work in your applications

Drive unless you're ready to give your heart a workout. Careening around turns and burnine rubber are what this game's all about. You don't know what excitement is until you have to pass a truck and two cars and then swerve back into your own lane within mere feet of an oncoming car. You'll do well to avoid any distractions while playing. If you take your eyes off the road while flying along at triple the legal speed limit, you won't last long.

While the game does lean more toward action than simulation, great care was taken with both the look and the feel of the cars. Yes, feel! These cars all handle differently, and my autominded friends tell me that the simulations are good. An onscreen spec sheet gives you a rundown on each car, including its top speed, engine type, and approximate price.

If this game has a fault, it is that Accolade did not take the simulation further. You have control only over the accelerator, shift, steering wheel, and brakes. The only working displays are the speedometer, tachometer, and radar detector. It would have been nice if the simulation had been extended to include the clutch, fuel gauge. and other minor displays. The CGA version is limited

to the standard 4 ugly colors, but in 16 colors on an EGA display, Test Drive is beautiful. The added color is used for some unexpected and entertaining details, such as showing a reflection of your car in puddles as you pass by



the one of your dreams and head for the open road

Processor speed did not appear to affect the speed of the game, but it did change the response time of gear shifts and maneuvers, giving those with faster machines an advantage. Whether you consider this fair will depend on the speed of your own machine. If you are into driving sports

cars along winding mountain roads at 150-mph speeds, Test Drive lets you indulge your passion safely and legally. The limitations inherent in the simulation don't detract from how much heart-racing fun this game really is. Test Drive took the PC Labs by storm, occupying lunch hours and after-hours longer and more often than any other computer game except Mean 18, the classic golfing game, also from Accolade. Like Mean 18. Test Drive is destined to be-

come a classic List Price: Test Drive, \$39.95 (for 31/2- or 51/4-inch disks). Requires: 256K RAM (384K for IBM with EGA and for Tandy 1000, 1200. and 3000); one disk drive; CGA. EGA, or Hercules MGA; DOS 2.1 or later. Joystick optional. Copy protected, Accolade, \$50 So. Winchester Blyd., San Jose, CA

95128; (408) 296-8400 CIRCLE 869 ON READER SERVICE CARD



The difference between having power...



"For students, Microsoft * QuickC™ is the ultimate programming environment."

"For my research work it gives me an all-in-one product for development, while providing interlanguage calling as well as compatibility with Microsoft C5.0."

Dr. Kent Chamberlin, University of New Hampshire, Department of Electrical and Computer Engineering.

"With its integrated debugging on-line help, Microsoft QuickC v the clear choice as the standard (compiler for our courses."

MAG

Α

Greg Tinfow, R & D Engineer, Smart Product E Laboratory, Stanford University.

"OuickC's built-in graphics, debugger and superb on-line help are formidable features to overcome." PC AI Magazine (comparing QuickC to Turbo C), Fall 1987, by Brian Flamig, reprinted with permission

It seems our C got an A.

"If you are new to C. Microsoft OuickC can make the difference between learning C and giving up in frustration."

Jim Nech, President, Houston Area League of PC Users (HAL PC).

"OuickC is better than Turbo C." It does everything that Turbo C does, and then some, incorporating very good debugging support that is totally absent from Turbo C.

Not bad, for a \$99 compiler. Call (800) 541-1261, Dept. E66 and we'll send you a free information packet, including details of how to obtain a TurboPascal* to Microsoft OuickC translator program.

And to make QuickC even more irresistible, how does a 30 day moneyback guarantee

grab you?

